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THE

Mather Incandescent Dynamo

FOR

ISOLATED LIGHTING

Is pronounced by the First Electrical and Mechanical Experts in the Country to be the

BEST DYNAMO MACHINE YET PRODUCED.

10 REASONS WHY.

1. It is the most efficient.
2. It is simpler in its construction.
3. It has fewer parts.
4. It is less liable to get out of order.
5. It requires less care in its operation.
6. It is perfectly automatic in its regulation.
7. It requires less space.
8. It is impossible to get the bearings out of alignment.
9. It is noiseless in operation.
10. It does not spark at the brushes.

The only Incandescent System using Lamps of higher Voltage than 110 Volts.

The Mather Motor possesses all the advantages of the Incandescent Dynamo, as stated above.

REDUCTION IN PRICE.

Owing to improved and increased facilities for manufacturing, THE MATHER ELECTRIC COMPANY is prepared to furnish to parties desiring to purchase their dynamos for use or sale at greatly reduced prices. Special inducements will be offered to Construction Companies desiring to install the Mather Incandescent Dynamo for Light or Power.

A Few of the Plants in Operation and in Process of Construction of the Mather System:

The American Waltham Watch Co., Waltham, Mass	2,500 Lights.	Mellen Hotel, Fall River, Mass	600 Lights.
Coronado Beach Co., San Diego, Cala., Hotel	2,500 "	Providence Machine Co., Providence, R. I	500 "
Pioneer Press Co., St. Paul, Minn	2,000 "	H. B. Claflin & Co., New York, N. Y	500 "
Cheney Brothers' Silk Works, So. Manchester, Ct	2,000 "	E. Ingram Clock Co., Bristol, Ct	500 "
S. D. Warren & Co., Cumberland Mills, Me	1,500 "	Church Green Block, Boston, Mass	500 "
Colonnade Hotel, Phila., Pa	1,000 "	Read House, Chattanooga, Tenn	500 "
Hartford Light and Power Co., Hartford, Ct	1,000 "	E. F. Weickert, Neenah, Wis	500 "
Wardner, Bushnell and Glessner, Springfield, O	1,000 "	Kentucky Wagon Co., Louisville, Ky	500 "
Plimpton Mfg. Co., Hartford, Ct	750 "	Aldrich & Milner, Moosup, Ct	500 "
Hennepin Avenue Theater, Minneapolis, Min	700 "	Glen Cove Starch Co., Glen Cove, N. Y	500 "
Amberg Theater, New York, N. Y	600 "	P. H. Glatfelter, Spring Forge, Penn	500 "
Border City Mfg. Co., Fall River, Mass	600 "	E. Merritt & Sons, Houlton, Me	500 "
Commercial Gazette Co., Cincinnati, O	600 "	Putnam Woolen Co., Putnam, Ct	500 "
St. Paul, Minneapolis and Manitoba R. R., St. Paul	600 "	Morgan Envelope Co., Springfield, Mass	500 "

F. P. Blair, Apartment House, St. Paul, Minn.....500 Lights.

THE MATHER ELECTRIC COMPANY,

MANCHESTER, CONN.

ELECTRICAL REVIEW

ILLUSTRATED.

A WEEKLY JOURNAL OF

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An Electrical Problem in Harrisburg, Pa.

Although philosophers have never been able to determine whether electricity is a condition or a theory, a case will be tried by the courts of Dauphin county, at Harrisburg, Pa., next month, in the hope of throwing light on a very ancient dispute. Under the act of 1885 manufacturing companies in Pennsylvania, with very few exceptions, are exempt from taxation. The State authorities have refused to recognize electric light companies as manufacturers, and several of these corporations have appealed from the settlement of the tax which the commonwealth has imposed upon them. The novel point to be decided is whether or not electricity is manufactured.

More Light in New Orleans.

A resolution authorizing the Mayor to contract with the Louisiana Electric Light and Power Company for the erection of additional electric lights during 1889, to be paid for out of the monthly deductions for lights not lighted, and the rates and under the conditions mentioned in ordinance 2295 C. S.; provided that in case said deductions are insufficient to fully cover the cost of the additional lights, the company agrees to furnish the lights free of cost, provoked considerable debate in the New Orleans council, owing to the unwillingness of some members to burden the electric light company with any additional lights. The ordinance was finally adopted.

Edison's Phonograph Works at Orange, New Jersey.

With remarkable despatch two large factory buildings have been erected on the large common back of the Edison Laboratory, which is located at the foot of Llewelyn Park, Orange, New Jersey. A few months ago the ground was unoccupied. To-day over 300 employés, chiefly skilled mechanics, are employed in the two factory buildings which are devoted exclusively to the manufacture of the Edison phonograph. It is understood that when Mr. Edison sold the commercial business of the phonograph for the United States, of which he is said to have received over a half million dollars in United States currency, he alone retained the right to manufacture.

For the past two months the leading manufacturers of fine machinery, such as E. E. Garvin & Sons, New York; Pratt & Whitney and Dwight Slate, of Hartford; Brown & Sharpe, of Providence, etc., have been engaged in suplying the phonograph works with some of the finest and most costly machinery it has been our fortune to see, and at a rough estimate we should say there is at least $100,000 worth of such machinery now in daily use at the works engaged in turning out the various parts of the improved phonograph. The work of assembling these parts will begin in the course of the next 30 days, and by January 1st, 1889, it is expected that 100 phonographs per day will leave Orange, New Jersey, for users in all parts of the globe.

These works are entirely independent of all the other establishments of Mr. Edison, but are located conveniently near his magnificent laboratory, where the inventor spends his days and a good many nights. It is evident that the phonograph is Mr. Edison's pet; and that he has the most unbounded faith in its future, a trip to his phonograph works will convince every one.

Lieut. F. W. Toppan, U. S. N., is the manager of these works, and soon expects to be supplying the Edison phonograph, perfected in every detail, not only to customers in this country (through the North American Phonograph Company), but to all nations of the globe. When the work of assembling the instruments begins the employés will be increased in number, and the phonograph works become one of the busiest instrument manufactories among the many electrical manufacturing establishments.

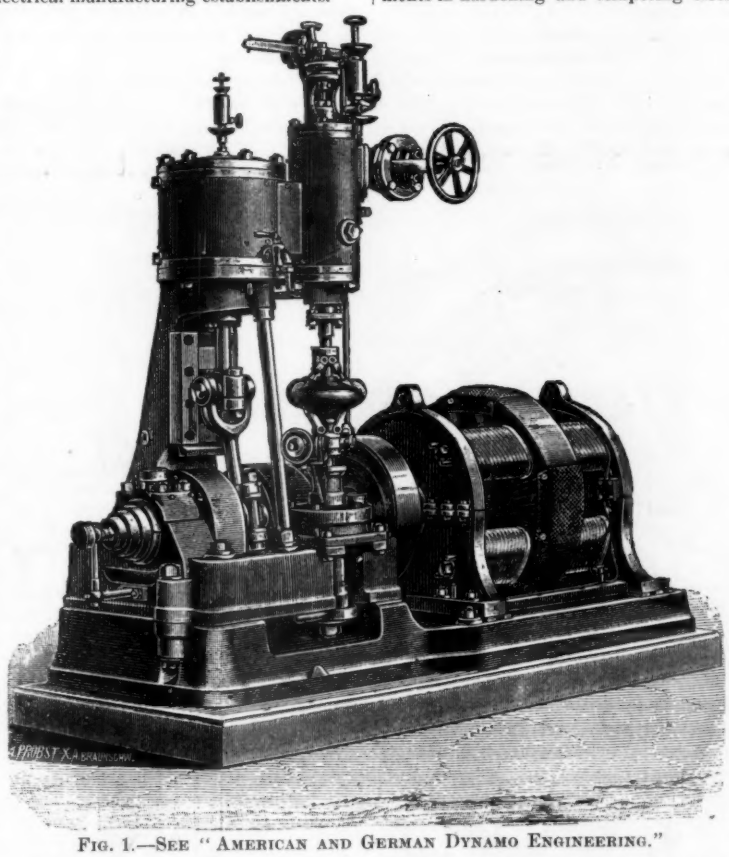


FIG. 1.—SEE "AMERICAN AND GERMAN DYNAMO ENGINEERING."

The Supreme Court Decision.

Dr. S. M. Plush, General Manager of the Bell Telephone Company, of Philadelphia, has the following to say concerning the recent decision:

"I do not apprehend any serious trouble to us from the decision. It simply opens the case to argument on its merits. The suit upon which this decision is based was originally brought in a Western court. It was then decided the suit had to be brought at the home of the parent company, Boston. In the suit was then entered a demurrer, claiming that the Court had no jurisdiction, nor would the Government engage in a suit against individual rights. The Supreme Court has set aside the demurrer, and ordered that the Massachusetts Court shall hear the case upon its merits. The stock of the company fell $8 per share yesterday, and it afforded some one with money a splendid opportunity to buy short on Bell Telephone."

S. B. Hueby, attorney for the Philadelphia company, said:

"It is a point of pleading only. The merits of the case did not enter into the consideration of it; it is the old Pan-electric question as to the validity of the Bell patent. It differs from all the other suits against the Bell company, in that the question of the validity of the Bell patents is the only one, and the plaintiffs do not attempt to establish priority of invention for any individual telephone of their own construction. The decision merely opens the Courts to further attacks on the Bell patents, but that is but a short step towards affecting the Bell company's rights."

"Hardening and Tempering Steel by Electricity."

TO THE EDITOR OF ELECTRICAL REVIEW:

In reply to Mr. J. W. Dyscee's inquiry in your current number, would say that experiments in hardening and tempering steel in the form of blades, ribbons, wire, etc., by electricity, have been successfully carried on for some time past by Mr. Elias E. Ries, of No. 430 S. Broadway, this city. Mr. Ries, if I remember rightly, first took up the subject in connection with his system of electric welding and tempering, and has recently been engaged in adapting his process to the requirements of several important industries. The class of work so far accomplished has proven itself to be far superior in point of quality, uniformity, simplicity and economy, than any that has heretofore been produced by the ordinary methods of heating, hardening and tempering, and the process strikes me as being one that (owing to its many practical advantages) will sooner or later find its way into very general use in manufacturing and metal working establishments.

Yours truly,

ALEXANDER GROSS.

1711 E. Pratt St.

BALTIMORE, Nov. 17, 1888.

American and German Dynamo Engineering.

One of the problems which soon presented themselves in regard to the application of the motive power to dynamos, was the question: How to do away with the complication of shafting and belting, and connect the dynamo axle directly to that of the driving steam engine.

It was found out in the early days of the dynamo (which, notwithstanding its prosperous growth, is still in its babyhood) that the rapidity of its revolution is a most important factor in its effectiveness, as this increases in proportion as the velocity of those parts of the armature which receive the inductive influence cut the lines of force emanating from the magnetic pole-pieces of the field. It was, therefore, evident that in order to obtain an available connection between the axles of driving engine and dynamo, either the steam engine must be so constructed as to enable it to produce an unusually great number of revolutions (say 600 or more per minute), or the size of the armature must be largely increased, so as to increase the velocity of its periphery, which, of course, is always in a direct ratio to its diameter. A six-fold increase in size of the armature will be electrically equivalent to a six-fold increase of the velocity of the steam engine.

In this country we have tried to solve the problem by the first-mentioned device, namely, rapidly moving engines. One of the first of this kind was devised by Captain Ericsson, who made the working drawings for an engine and dynamo revolving on the same shaft, for the Delamater works, West 14th street and 10th avenue, where it was built and has been kept in operation for some years. It operates with oscillating cylinders, makes from 600 to 1,000 revolutions per minute, feeds some eight or ten arc lights in the foundry, and occupies no more room than the well-known coal-boxes, familiar to all New Yorkers as an appendage to the corner groceries, in fact, it is enclosed in a similar box, the local necessities not allowing it to occupy more room.

In Germany the inventive genius appears to have worked on the other track mentioned, namely, increase of the diameter of the armature. The first machines of this class were built by Guelcher, of Biela, who, by quadrupling the diameter of the armature, reduced the necessary number of revolutions from 600 per minute, to less than one-fourth of this amount. Our Fig. 1 represents such a machine, by Guelcher, of which the effectiveness was so favorable, that a company was soon formed under the name of the Helios Stock Company, in Ehrenfeld, Cologne. Encouraged by the results, they went a step farther, and conceived the idea to transform the fly-wheel of the steam engine into the revolving armature, and build machines in which the rim of the fly-wheel carries interiorly the armature coils which revolve around the stationary field placed in its interior, with the pole-pieces turned outward, while the stationary wrought-iron spokes connect them with a wrought-iron ring, which serves as a yoke for all the magnets of the field.

These colossal dynamos are made in four

series, of which the output was found as follows :

Model.	Output in Watts.	Number of revolutions.	Consumption of h.p.
A	15,000	150	25
B	30,000	130	52
C	52,000	130	90
D	97,500	110	170

Our figures 2 to 5 give details of the construction of the fly wheel armature. Fig. 2 is half of the front view, and Fig. 3 a vertical cross section through the axis. *E* is the wrought iron ring serving as yoke for all the pole connections of this magnet wheel, *AB*, which is stationary. The German description before us does not give sufficient data for a clear explanation, but only states that the maximum capacity of the wires is 1.3 amperes for one square millimeter, and that the dynamo gave 600 amperes by 65 volts for only 90 revolutions per minute. It was first made in 1887, and a still larger machine was placed in the central electric light station in Amsterdam, Holland, and is considered the largest dynamo in the European continent. Of these peculiar dynamos the results appear to be so favorable that the station company at present confines itself to the introduction of slowly revolving dynamos for central stations.

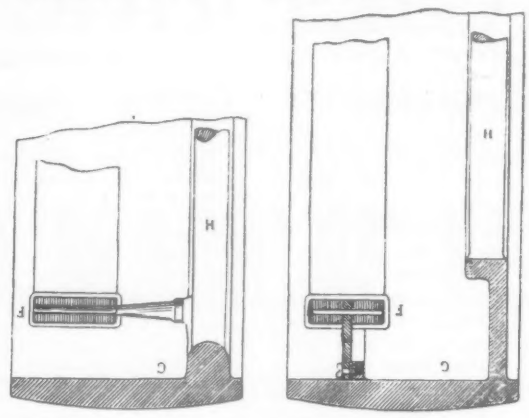
Practical Notes Concerning the Construction, Use and Management of Storage Batteries.

BY A. RECKENZAUN.

With this issue we bring the series of "Notes" to a conclusion. The subject has by no means been exhausted—indeed, it has received but a general treatment; and the original subject—viz, that of publishing a few important experiments and observations—had to be kept in view. Great strides have been made in the manufacture of storage batteries since the commencement of these "Notes," but the principles enunciated therein from time to time still hold good within the limits of their treatment. By far the greatest portion of these articles related to results of experiments made by the author, and these were limited to storage batteries of the most popular kind, composed of lead and oxides of lead. Up to a recent date these were the only commercially successful ones. Mr. Howell's new storage battery, which is now being introduced by Messrs. Crompton & Company, appears full of promise, but little is as yet known concerning its general properties. Mr. Howell's plates consist of spongy lead slabs produced by a peculiar process, the essential feature of which is kept secret. Contrary to popular notions, these plates are made to give considerable storage capacity, when compared with their weight, and the process of "forming" is said to occupy not more than two or three weeks, and without frequent reversals, differing therefore from the ordinary metallic lead or Planté types. Mr. Howell informed the author that a sample cell, containing 17 plates, weighing together 35 pounds, and each plate measuring six by six inches, gave a capacity of 185 ampere hours, at an average rate of 30 amperes, and that for the space of 10 minutes a discharge rate of 600 amperes had been maintained. According to this statement we have the very interesting fact that spongy lead plates can be made to yield 5.28 ampere hours per pound of metal at a considerable rate of discharge. Although no mention is made as to the durability and cost of these plates, we are assured that these items will be found satisfactory.

Copper as an Element in Secondary Batteries.—About seven years ago Mr. Sutton invented a storage battery composed of a lead plate to be peroxidised, and a copper plate to be alternately dissolved and deposited from the solution of sulphate of copper. This battery has not found any industrial application for obvious reasons: the action in a cell with metallic solutions is not constant, the layer of liquid in contact with the metal changes, and eventually refuses to act. In charging, soon after the first action there is no metallic salt present to decompose, but merely acid, which gives off gas, and then the metal deposit becomes non-adherent. In discharging, the metal salt forms too rapidly to dissolve and crystallises on the plate. These crystals form "trees," and eventually short-circuit the plates. It is for this reason, also, that the zinc-lead accumulator remains still within the precincts of the laboratory.

Messrs. Commelin, Desmazures and Bailhache in May, 1887, brought out a new accumulator, in which copper plays an important part. For the description of this we are indebted to M. Reynier's work, "L'accumulateur voltaïque."



FIGS. 4 AND 5.—SECTIONS OF FLY-WHEEL ARMATURE.

The positive electrodes of this battery are made of porous plates, obtained from finely-divided copper under a pressure of 600 kilogrammes per square centimetre. Electrolytically-reduced copper, free from oxides, is used.

The negative electrodes are of tinned iron plates; these are amalgamated. The tin has to hold the mercury which does not adhere to the bare iron. The receptacle is made of tinned sheet steel; the negative electrode rests at the bottom of the box, and it is in contact with it. The electrolyte consists of water, zinc and potash in the following proportions:

Water	1,000
Zinc	144.67
Potash in solution	209.82
" free	313.72

The positive electrodes are enveloped in parchment paper, and insulated from the negatives by means of glass rods. The parchment is stitched on, and although the seam is not water-tight at first, it becomes so through the action of the liquid, which causes the paper to stick fast. The parchment undergoes a change through the action of the alkali; it swells and becomes brittle, but it appears to hold on a considerable time without breaking, if no mechanical disturbance takes place.

Without the parchment the action is irregular; the oxidation of the positive electrode is not complete, and deposits of zinc are mixed with copper; hence, want of adherence and local actions or short-circuits through the formation of "trees," as in other batteries where metallic deposition takes place. These envelopes, therefore, play a very important part.

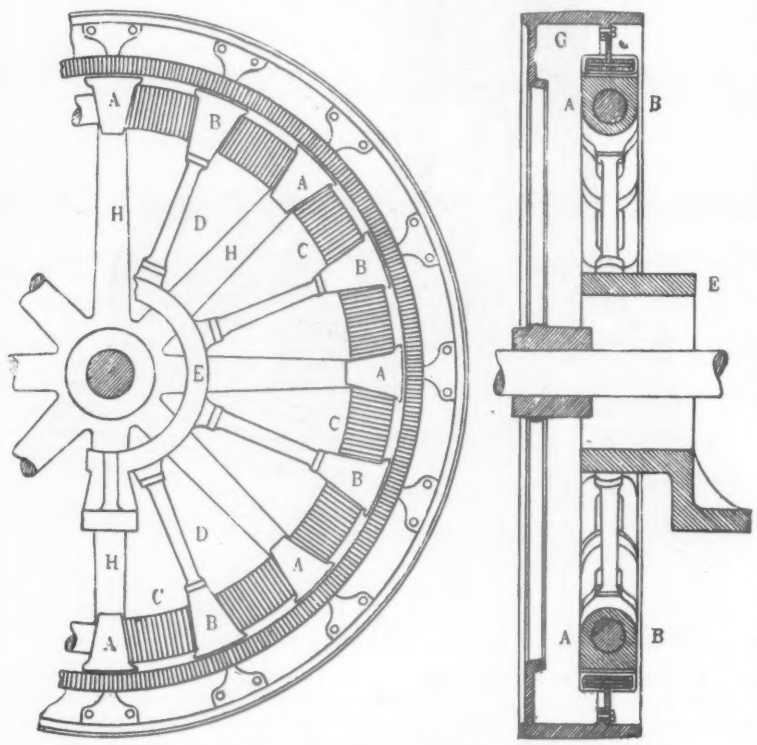
M. Finot, the chemist who examined this invention, gives the reactions during the discharge thus:

$$Zn + KO,HO,\ Aq + Cu_2O = Zn\,O,\ KO,\ Aq + 2\,Cu + HO,$$

but there appears to be a doubt as to whether this is the correct rendering of the equation, and it requires confirmation; curiously, there are hardly two authorities who agree on the subject of chemical reactions in secondary batteries.

M. Finot ventures another theory in the *Bulletin de Societé Internationale d'Electriciens*, where he states that during the charging of a copper accumulator one observes a curious phenomenon, which tends to show that oxygen does not combine with the copper, but that it may be occluded, and this occlusion may be due to peculiar properties of the porous plates.

When the apparatus is being charged one may observe that from the commencement of charging the level of the liquid rises and continues to rise until the charge is discontinued. On the other hand, during the discharge, the reverse takes place: the liquid falls gradually, and does not resume its original level until the battery is entirely discharged. If, says M. Finot, the oxygen did combine with the copper, no rise in the level of the liquid would manifest itself until all the copper had entered into combination. Thus the oxygen fills the pores of the plates, displaces the liquid, and causes the increase in volume.



FIGS. 2 AND 3.—SHOWING DETAILS OF FLY-WHEEL ARMATURE.

During the discharge again, oxyen should disappear immediately, and the liquid resume its normal level a few minutes after closing the circuit, but this is not actually the case.

M. Reynier thinks that these observations do not appear sufficient to demonstrate that occlusion of oxygen takes places in the positive plates, and he asks whether the rise of level in the liquid is not due to changes of volume in the plates, one of which is oxidized and the other covered with zinc? In order to decide this question the densities of the liquid as well as of the positive plates should be ascertained after the charge; from this may be deduced the total volume of the electrodes and of the liquid. By this method it could easily be determined whether the hypothesis regarding the occlusion of oxygen is correct.

The following weights and dimensions were given by M. Commelin, and they refer to an accumulator which has been constructed for the purpose of propelling a small torpedo boat. The storage capacity of the cell has been ascertained in the laboratory by the inventors:

Weight of cell in working order	22.046 lbs.
" 5 positive plates	4.25 "
" 6 negative plates	2.32 "
Height of positive plate	11.02 inches.
Width " "	4.92 "
Height of negative plate	11.81 "
Width " "	4.92 "
Surface of positive plate	54.22 square inches.
" negative plate	58.1 " "
Receptacle, length	5.905 inches.
" width	3.346 "
" height	15.75 "
" weight	2.204 lbs.
Electrolyte (1.55 S. G.) weight	13.224 "
Useful E.M.F	.75 volt.
Current, charging	15 amperes.
" discharging	48 "
Time of charging	30 hours.
" discharging	9½ hours.
Useful capacity	413 ampere hours
"	.42 H. P. hours.
Capacity per pound of cell	18.72 ampere hours
" " "	14.12 watt hours.
Weight per H. P. hour	52.47 lbs.

According to a Note (communicated in March, 1888) by M. Krebs to the Académie des Sciences on "L'Essai d'un moteur électrique alimenté par des accumulateur destinés à un bateau sous-marin," the total weight of a Commelin-Desmazures battery to give one horse-power hour, was found to be 37 kilogrammes, or 81.55 pounds.

This is not a very great advance upon what has been accomplished with certain lead storage batteries weight for weight. The volume, of dimensions of the copper storage battery are smaller than those made of lead, whilst the efficiency may be alike in both.

With regard to cost one may infer that lead and dilute sulphuric acid must be cheaper than copper and potash; and as to other points of interest we have to ask whether it is necessary to amalgamate the negative plates frequently? How long will the parchment envelope last? What changes take place with the electrolyte in the course of time? No doubt positive plates made of copper are more durable than those made of lead, but the general item, *depreciation*, has yet to be ascertained; if it turns out to be a very small quantity then we may ignore the question of first cost, and then we can congratulate Messrs. Commelin, Desmazures and Bailhache, as well as those in search of a novel storage battery, for an achievement, the beneficial results of which cannot easily be over estimated.—*London Electrical Review.*

Prescribing by Telegraph.

VICTORIA, B. C., Nov. 19.—Lord Ennismore, heir to the Earldom of Listowell, is lying at the point of death in the hospital here with typhoid fever, accompanied by other complications. Through the aid of Sir Donald A. Smith, who is in London, a telegraph circuit was formed from London to Victoria by cable and telegraph, and Sir Andrew Clarke, the distinguished London physician, was placed in direct consultation with Dr. Hannington in Victoria. A conversation lasting three hours was carried on. Replies were received in three and four minutes. Lord Ennismore, though still in a dangerous condition, was somewhat better last evening. His father, the earl of Listonwell, sails from Queenstown by the Gallia for Victoria.

The Daft Electric Railway Motor "Franklin."

The electrical service upon the Ninth avenue line of the New York Elevated Railroads has been tentatively in operation—at intervals—for some time.

Both the Daft and the Edison-Field interests received simultaneous permission to equip portions of the Ninth and Second avenue lines, respectively, and commenced operations. The former persevered to the end in the tedious work of laying a central conducting rail, without interfering with the regular traffic, on the double track between 14th and 52d streets, a distance of two miles, and equipping a power station at 15th street, about 300 yards from the lower terminus. This location was purposely chosen to afford a chance of observing the fall of potential at as great a distance as possible. It proved to be barely appreciable, and would naturally have been no greater on a four-mile stretch with the power station centrally placed.

The conductor was at first an ordinary 56 pound rail mounted upon an insulator of the familiar Baltimore type. The loss of current upon the two miles of double track and the switches, considerably over four miles in all, was only nominal. Electrical connection of the rails was effected by riveting strips of copper between them, drilling through the webs for the purpose, and the joint-resistance was readily reducible to that of the solid rail.

Subsequently it was thought advisable to substitute a conductor of copper for the iron rail, and the requisite quantity of round rod, five-eighths of an inch in diameter, and in convenient lengths, with ends adapted to meet the rigid exactions of expansion, contraction, conductivity and insulation, was gotten ready.

The change of shape and size demanded a modification of the original insulator, and the form adopted was a bracket-arm, topped with an inverted rectangular iron cup, which was thoroughly insulated from the arm, and surmounted by a clamp which enveloped a little more than half the circumference of the conductor, and, while freely permitting longitudinal motion, effectually secured it in proper position. The insulation was entirely between the inverted cup and arm. This modification of the insulators and conductors rendered advisable the abandonment of the old contact-wheel, and the substitution of metallic brushes pressing upon the conductor and sliding along it, for leading the current to the motive machinery.

The tediousness of attaching these insulators to the guard timbers of the tracks and securing the conductor in them without in the slightest degree interfering with the regular traffic of the line, could hardly be comprehended by one who had not witnessed it, but in spite of all it was completed without accident.

It should be clearly understood that the experiments with the "Franklin" previous to this autumn, were made with electromotive machinery of hardly half the power of that with which she is now equipped, and, while it handled two loaded cars satisfactorily, it gave evidence of overwork in the effort of acceleration at starting trains, and the power has been increased to the equivalent of that which careful measurement has shown a steam-locomotive drawing the standard train to exert under the same circumstances. She now handles eight empty cars – a load 54 tons in excess of what she was guaranteed to pull—with complete facility.

In the power station, four dynamos of 50 horse-power each, supply the current, and a fifth, of smaller size, serves to light the place. The power dynamos are connected with a switchboard which permits of their being used "in parallel" or "in series," as may be desired, without trouble or delay.

These terms merit a word of explanation, as the first of them describes a disposition which is an important factor in the economical generation of dynamo electricity. When two machines are connected—both positive poles to one leading wire, and both negative to another—they are said to be "in parallel," and the current obtained is greater than the sum of the currents of both working separately, in direct ratio to the reduction of their internal resistance brought about by the coupling.

This arrangement may be carried farther, but with a rapidly lessening degree of advantage. Coupling machines "in series" consists in passing the current of the first through the second, and so on.

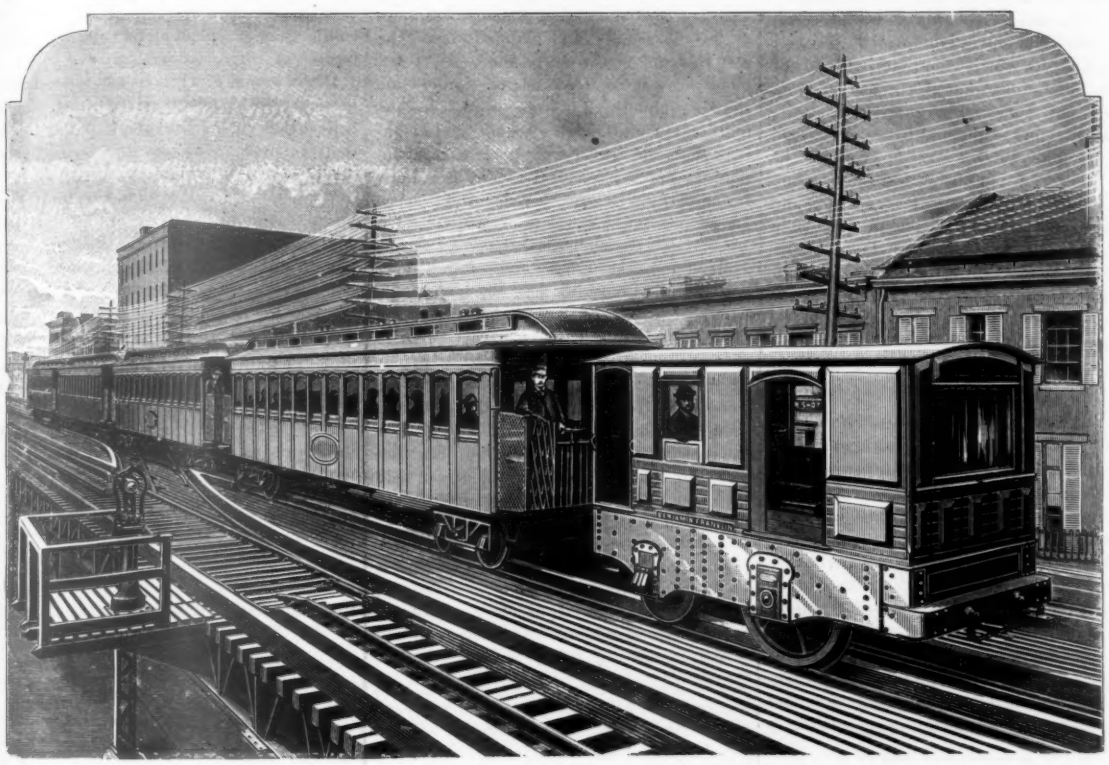
An important instrument is the automatic cut-off which is brought into play by the occurrence of a "short-circuit" on the track, and opens the *ketee*, or chain, as our German friends term it, at a fixed point, sounding at the same time an alarm. This contingency, which might befall through accident or mischief, would have the effect of unduly lessening the resistance, and so increasing the quantity of current that it might develop enough heat in the insufficient circuit to destroy the insulation of the field magnets and armature coils, and disable the machines.

The steam-engine that drives the generators is of 250 horse-power, and the potential of the current developed 280 volts, a step beyond that used at Baltimore, but still within the danger-limit.

The illustration of this article shows the "Franklin" with a four-car train upon a siding during its off hours. In her experimental runs she has repeatedly drawn this train with less than three-fourths the current-generating capacity in use, up and down the line at a speed of 25 miles per hour.

With the same current and three unloaded cars, a speed of 30 miles per hour was kept up uninterruptedly for a long time.

The commercial outcome of the achievements of the "Franklin" could hardly be forecast; but, in consideration of the well substantiated claim that the substitution of such motors on the New York elevated railways would reduce the running expenses about 50 per cent., and this even when including, as a fixed charge, the interest on the cost of re-equipment, and also without allowing any rebate for the sale of the present steam locomotives, which are of standard gauge and available on any ordinary track; there should be little doubt as to the probable line of action of such a sagacious and far-sighted management as that of the New York Elevated Railways.



View of Daft Electric Motor on Ninth Avenue Elevated Railway.

The Demand for Storage Batteries.

The Julien Electric Company are making largely increased sales of their storage battery. From November first to the sixteenth, eleven (11) installations have been sold, amounting in all to 1,540 accumulators, the largest sales probably ever made here or abroad in the same length of time, by any company engaged in storage battery business. The Julien Electric Company have now a thoroughly equipped installation department; and announce that they have reduced the storage battery industry to the same practical level as the business of direct lighting.

A Strong Electric Construction Company.

The Eastern Electric Construction Company, with G. C. Moses, of Bath, Me., as president, and F. A. Sawyer, of Portland, Me., as treasurer, has been organized in Portland, to contract for and build electric light plants, electric railways, etc. The board of directors and officers are composed of well-known and influential business men, and it is their intention to do business on a safe and conservative plan. They are the owners of the following property: Bath Electric Light & Power Co., Bath, Maine; Bennington Electric Light & Power Co., Bennington, Vt.; Hoosick Falls Electric Light & Power Co., Hoosick Falls, N. Y.; Millers River Gas & Electric Light Co., Athol, Mass.

A Compliment to a "Review" Correspondent.

I am glad to hear that under the skillful management of Mr. Edward A. Oldham, the Charleston (S. C.) *World* is succeeding admirably. The company is talking of putting up a new building of its own, and has recently ordered another rapid perfecting press. On election night they displayed the election returns by means of as large a stereopticon as was used by any of the New York papers, and in fact it is in every way "booming." The field is broad, and no paper in the south has been built up so rapidly as has the *World*. It only goes to show what brains and energy can do with a paper. Mr. Oldham is making a bright and successful paper, and is to be congratulated. —*N. Y. Journalist.*

New York City.—The Magazine Projectile Company of New York City. Capital stock, $100,000.

Pittsburgh, Pa.—The Pittsburgh Phonograph and Graphopone Company of Pittsburgh. Capital Stock, $750,000.

Fort Worth, Tex.—The Fort Worth Electric Lighting Company of Fort Worth. R. E. Maddox and others, incorporators.

New York City.—The National Electric Company. Capital stock, $20,000. Henry C. Comegys and others, incorporators.

Denver, Col.—The Monitor Zinc Company of Denver. Capital stock, $100,000. James Patrick and others, incorporators.

Saco, Me.—The Advance Electric Company of Saco. Capital stock, $200,000. N. J. Bradler, of Boston, and others, incorporators.

Waco, Tex.—The Central City Electric Light Company of Waco. Capital stock, $30,000. M. D. Herring and others, incorporators.

Chicago, Ill.—The Johnson Magnetic Paint Company of Chicago. Capital, $25,000. Incorporators: J. E. McDougal, O. C. Barres, and Samuel Fenton.

Camden, N. J.—The West Jersey Construction Company of Camden. It is stated that the real purpose is to start an electric railway from Camden to Merchantville.

Camden, N. J.—The Vangezell Valve and Manufacturing Company filed articles of incorporation, with an authorized capital of $100,000, of which $2,000 is said to be paid in.

New York City.—The North American Underground Telegraph and Electric Company of New York City paid a tax of $3,125 to the Secretary of State for the privilege of increasing its stock from $2,500,000 to $5,000,000.

Kingston, N. Y.—The Kingston Electric Light, Heat and Power Company of Kingston. Capital stock, $50,000, with George J. Morse, George B. Merritt, William Hutton, Thomas H. Tremner, and Reuben Bernard, incorporators.

Camden, N. J.—The Weil Gas Enriching Company. Capital $1,000,000, of which $1,000 is said to be paid in. The incorporators are Philip D. Spooner, Charles H. Baker, Robert R. Reardon, Samuel L. Small and Marmaduke B. Taylor.

Camden, N. J.—The West Jersey Construction Company of Camden. Capital, $25,000, of which $1,000 is said to be paid in. The incorporators are William S. Scull, William T. Bailey, J. Willard Morgan, George Barrett, John J. Burleigh, Edward Ambler Armstrong, and David Baird.

Chicago, Ill.—The Universal Fire-Proofing Company, East St. Louis. Capital, $1,000,000. To manufacture chemicals, paints, and fire-proofing compounds. Incorporators: Jerome Hill, Warwick Hough, William H. Hook, S. M. Chisley, C. F. Stephens, E. B. Adams, and C. M. Coer.

Brooklyn, N. Y.—The Brooklyn Steam Supply Company. The incorporators are Augustus J. Visel, William Knappman, Edward A. Fries and others. Capital stock, $15,000. The company proposes to supply steam, hot water or hot air for motive power in the streets and private buildings of Brooklyn.

Gardiner, Me.—The United Gas-Fuel and Light Company organized. Capital stock, $1,000,000; amount paid in, $225,000; par value of shares, $100. The stockholders are John T. Rowland, Jersey City, N. J.; Marcus R. Williams, Hackensack, N. J.; John Claffy, Brooklyn, N. Y.; Alfred King and Franklin Everhart, New York City. Marcus R. Williams is president, Franklin Everhart, treasurer.

ELECTRICAL REVIEW

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We invite correspondence from Electricians, Inventors, and the Telegraph and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

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NEW YORK, DEC. 1, 1888.

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Another large Wimshurst machine, similar to that made for testing the Deptford cable, is being made by Messrs. Mayfield, Cobb & Company, to be sent to the Paris Exhibition. The machine has eight 30-inch plates, and, it is said, gives a spark 12 inches in length.

The sudden death was announced last week of the wife of the editor of the *Electrical World*. Expressions of condolence can but poorly suffice one in the sorrow of such a loss, yet the REVIEW most sincerely extends its sympathy to Mr. Johnston in his sad and unexpected bereavement.

The newly devised French electrical accumulator is assuredly an astonishing mechanism, if all that's said about it is true. Neither lead nor acid is used. The potential is great and the loss small. It is especially adapted for motors. A large Paris railway is, we are told, preparing to use these accumulators on their line in place of horse traction.

The *British Medical Journal* cites a number of cases of Goitre (the immense swellings or sacs which sometimes adhere to the neck or head from infancy), cured by electrolysis. There has never been found any cure for this dire affliction, and this medical authority infers, and reasonably it would seem, that continual investigation will discover other ways by which electricity will do for the human family what all else has failed in.

The directors of the underground railroad in London are talking over projects for the use of electricity in place of steam as a motive power. Whoever has gasped and sneezed, and suffered spasmodic asthma in the sulpher-laden air of those London tunnels, will heartily wish for the sake of their English friends, that the change will be made. Besides, the tunnel is the coming solution of the problem of rapid transit through our own crowded cities, and it is economy for us to have experiments tried elsewhere.

The experiments recently made under the auspices of the French Government at Brest, in submarine telephony, though interesting, are not by any means novel or original. Fully 30 years ago experiments, almost identical, were made on the Swiss side of Lake Maggiore without the aid of a "hydrophone" of the type recently used. A metallic tube was thrust down into the water on one side of the lake by means of which the sounds caused by striking upon a submerged bell on the other side, and quite three miles distant, were distinctly heard.

It speaks well for the practicability of the Julien electro-motor that the Birmingham (England) Central Tramway Company, after a most exacting test, have concluded to adopt it. The conditions were that it should run a day's work of 60 miles with a cost comparing favorably with steam. The Julien people have built a motor of 40 horse power, though only 30 horse power are required, and, if all goes well, the 74 motors of the railway company will be taken off to make way for electricity. The people living on the line of the road are even more interested than the company for the adoption of electricity will do away with smoke and soot and flying cinders.

The REVIEW greatly regrets to hear of the severe loss by fire that has visited the works of the Ft. Wayne Jenney Electric Light Company. Although it seems that the company was well insured, there is no means of calculating the loss that must fall on the company because of the delay, little or great, that must occur in the delivery of goods, and just at this time the Ft. Wayne Company was engaged in filling a number of very large and important orders. Mr. R. T. McDonald, the very energetic manager of this company, is not the man to be daunted, however severe the loss, and will soon have the works rebuilt on a larger and much more extensive scale. Meanwhile the new factory, just completed at Plymouth, will be rushed night and day filling the orders already on file.

The Southern New England Telephone Company is rapidly connecting the towns and cities of Connecticut with double copper wires such as are used by the Long Distance Telephone Company, and such as now connect New London with New Haven.

The first of a fleet of electrical power boats, destined for public use on the River Thames, London, was launched from a yard at Chiswick a few days since. The boat is intended to carry 80 passengers. Her length is 65½ feet; beam, 10 feet; displacement, 12½ tons, and speed, with the conservancy regulation, six miles an hour. The machinery and storage cells are placed below deck. The boat carries 200 E. P. S. accumulators, and two 7½ horse-power motors drive twin three-bladed propellers.

A wide difference of opinion as to the profits of the electric lighting business, has been brought to notice by a recent controversy raised in Boston between a private individual, who supplied lights in his own and neighboring buildings, and a local light company. The former wished to run a wire across the street, to which proceeding the latter strenuously objected, and in a hearing before the gas commissioners on the subject, the testimony introduced by the company was that electric lighting business was more or less hazardous, and competition of the sort in hand could not be endured. Testimony was introduced on the other side showing abnormally large profits to the individual supplying his tenants and neighbors with electric illumination, and maintaining that the business should be as open to competition as any other line of business. Decision in the case was reserved.

Mr. Thomas A. Edison about four o'clock last Saturday morning left his laboratory, where he had been working all night, and got into his buggy to drive to his home in Llewellyn Park. The horse, one of a pair of magnificent grays, had been restive for some time from standing in the cold, and soon broke away and whirled around into the park entrance at a wild gallop. Mr. Edison took the reins from his driver, and held the animal well in the road for a short distance, when suddenly it swerved, and the wheel of the buggy striking a large stone, the vehicle was overturned. Mr. Edison was only slightly injured, but the coachman was badly cut and bruised, and suffered severe internal injuries. The horse ran half a mile, completely demolishing the buggy, and bringing up in a pile of stones with a broken leg and other injuries, and was shot and put out of its misery.

OF COURSE ELECTRICITY IS MANUFACTURED.

The Harrisburg, Pa., authorities are talking about laying a tax on electricity, although manufacturing in that state is not taxable. They are now trying to determine whether it is a "condition or a theory." We hope they will get on better than our State legislators did when the question of burying the wires was under discussion. Three times the Speaker had to remind one Solon that "insulation" and "installation" were not synonymous terms and that induction and retardation, referring to obstacles in the way of good underground service, were real, not imaginary.

A LOST ELECTRIC LIGHT PLANT.

Has any one seen an engine, two boilers and an electric light plant recently stolen from the building at 22d and Chestnut streets, Philadelphia? It seems the building was used till recently for the cyclorama of the battle of Missionary Ridge, and, when this was gone and the owner returned he found some one had calmly walked off with his entire plant. It's come to a pretty pass, indeed, when a man can't go off and leave a steam engine and lighting plant without the fear of its being carted away. Imagine a patron running in to ask why his lights are not aglow and being compelled to tell him that some one had decamped with the entire outfit. Perhaps it would be safer in Philadelphia to keep the fires going all the time. No man, however dishonest, would care to steal a bed of live coals.

OUR CHICAGO LETTER.

(Special Correspondence.)

At the last meeting of our City Council, Alderman Ernst introduced an ordinance to repeal the Bell Telephone Company ordinance, on the ground of non-user.

There was a little of the I'll-just-give-your-nose-a-twist sort of sweetening in this move of the alderman. He said that the company was originally a Boston corporation, which ceased to do business here in 1881. It transferred its franchise, or tried to do so, to the Chicago Company, but had not the right to so transfer its franchise. The president of the Chicago company had stated before the finance committee, that, failing to obtain a proper ordinance from the council, and establishing its right to operate under the old ordinance, his company would retransfer its stock to the original company, which could then revive its old ordinance. The purpose of this ordinance was to prevent this last scheme. He moved a suspension of the rules to pass the measure.

Cullerton thought such proceedings were in bad faith, and didn't approve of such snap judgments. The telephone company was disposed to make reasonable arrangements with the city. Hamline thought the legal status of the corporation was weak, and it was the duty of the Council to keep it so or make it weaker, so as to force the company to accept moderate and reasonable terms.

Dixon said that while he had labored hard to secure lower telephone rates, he did not believe in securing advantage by a trick like that proposed. The repeal of the ordinance would lead to litigation.

Wetherell asked if it would be fair to the business community to be cut off so shortly and sharply as proposed? Badenock supported the ordinance. The company was knocking at the door for an ordinance, and this was the best possible proof that it did not rely on doing business under the old ordinance.

The motion to suspend was lost, and the ordinance went to the finance committee.

The *Tribune* of this morning publishes the following as the opinion of the corporation counsel:

"(1) The city has no right under its present charter powers to fix the rates of telephone charges. It exceeded its authority in passing the recent ordinance, which would, however, become of binding force if accepted by the company. (2) The Bell Telephone Company has forfeited its rights under the old ordinance of 1878 on account of non-user. It had no right to transfer its franchise to the Chicago company, which has therefore usurped authority in using the streets of the city for its wires. (3) The use by the city of part of the wires and some of the instruments of the Chicago company and the permission granted from time to time to the corporation to string its wires and to put in its instruments confer no franchise on it. The city always reserves its rights expressly or tacitly. (4) The Chicago stockholders may transfer their stock back to the Bell Telephone Company, which may then resume its rights under the old ordinance if that instrument is not repealed in the meantime, because of non-user."

Baker's new theatre on Wabash avenue, between Eighteenth and Nineteenth streets, was opened, and "The Pearl of Pekin" acceptedly done to a house filled to overflowing. The house is beautifully lighted by incandescent lights of the United States variety, and although steam was not turned on until two P. M. of Monday, the plant started off in most excellent shape.

The dynamos, two in number, are run by Ide engines, the steam installation being under the supervision of Mr. W. B. Pearson.

The electrical work was done by Mr. E. S. Hewson, superintendent of the U. S. Company here.

Over in Kansas City (Kansas), there has been much talk in days gone by—for at least two years—about having a large central station, and lighting up that end of Kansas City (Missouri), and taking Wyandotte, Armstrong and Armourdale into the family circle, so far as light is concerned. A franchise was finally granted, and a contract made for lighting the main portion of the city with 100 arc lamps.

The Hamilton (O.) Corliss Engine Com-

pany will furnish a 250 horse power engine; the Babcock & Wilcox Company, of New York, will furnish three boilers of 92 horse power each, and the Electrical Supply Company, of Ansonia, will supply the wire, 30 miles of which is on the way.

The board of directors a few days since, having meantime done pretty much everything else, canvassed the matter of system, and awarded the contract for furnishing 150 arc lamps and six 25 light dynamos to the Hawkeye Electric Light Manufacturing Company, of Davenport, Iowa, whither the company removed recently from Oskaloosa.

A private exhibition of the perfected phonograph was given to members of the Chicago press, a few evenings ago, at the Grand Pacific.

A soprano solo, with piano accompaniment, which had been pickled some three weeks, was rendered, and showed a remarkable condition of preservation. A cornet solo, too, was so perfectly rendered that several of the pencil wrestlers were only restrained from jamming their ears full of fingers by that natural politeness which is the trade-mark of a genuine newspaper man.

Several of these gentlemen talked and sang into the pickle jar, and their voices were reproduced without injuring the machine—but it was a severe and critical test.

The Reynolds Telephone Organ and Piano Company at Chicago, was recently organized with a capital stock of $500,000, by A. J. Reynolds, W. L. Moss, Charles W. Needham and others.

The American Bell Company on the 22d inst., purchased the entire plant of the Superior Telephone Company at West Superior, Wis., for $35,000. This was one of the plants inaugurated and run by the Cushman Company, and suppressed by an infringement lawsuit.

The City Council of Elgin, Ill., is canvassing the matter of lighting the city by electricity. A committee consisting of the mayor and eight other gentlemen, at the risk of ruining their watches, soiling their consciences with hard thoughts, and their holiday clothing with oil and dust, was met nosing round several of the electric light plants on Friday, in view of the selection of a system for Elgin.

A well-know electrician and inventor has just patented a method of circumventing the labors of the fool-killer. It effectually prevents that class of idiots who commit suicide by blowing out the gas, from accomplishing that end. Trying to make the gas stay blown out is like contradicting a strong-minded woman. It will have the last say. To squelch it, it is positively necessary to turn it off. Turning it on lights it automatically. C. C. H.

Chicago, Nov. 24, 1888.

Personal.

Mr. A. H. Chapman, manager of the Municipal fire alarm system of Boston, was a New York visitor last week.

Mr. E. T. Gilliland and Mr. C. W. Ward returned from a short European visit last week, looking hale and hearty, and evidently ready for business once more.

Dr. Leonard Waldo, so widely and popularly known in scientific circles, is now located at Lockport, N. Y., as manager of the extensive works of the Cowles Electric Smelting and Aluminum Company.

Mr. A. R. Foote, of Cincinnati, a non-resident member of the Electric Club, gave several very pleasant little dinner parties in the private dining room of the Club. Mr. F. B. Thurber, of New York, was among the Club's visitors on one of these occasions, and had many words of praise of the Electric Club and its excellent *cuisine*.

Mr. John I. Sabin, vice-president and general manager of the California Electrical Works, vice-president and general manager of the Pacific Bell Telephone Company, vice-president and general manager of the Sunset Telephone Company, vice-president and general manager of the Pacific Edison Phonograph Company, etc., etc.. etc., is a New York visitor with rooms at the Electric Club. So as to be fully occupied on his return, Mr. Sabin contemplates the organization of a few more electrical companies for the Pacific coast before he leaves the East.

A very successful trial of the Daft motor was given on the Ninth Avenue Elevated Road last Monday evening, in the presence of representatives of the electrical press, and railroad and financial men of New York. The motor, weighing a little less than 10 tons, hauled four cars loaded with passengers—a total weight of 70 tons—from the 14th street station to the 50th street station, a distance of $1\frac{4}{10}$ miles, in eight minutes, the return being made in about the same time. Everything ran smoothly, and without the slightest hitch. The rain was falling all evening, and this fact made the trial and its success all the more valuable and important.

OUR BOSTON LETTER.

(Special Correspondence.)

The new electric railway on the Thomson-Houston system, at Lynn, was put into operation very auspiciously on Monday morning. The road encounters many exceedingly steep grades and sharp curves, and its successful operation, while surprising many, is but a demonstration of the excellence of the system and truth of claims made by the Thomson-Houston Company. Through the courtesy of the officers of the road, your correspondent was given exceptional facilities for a thorough examination of its practical workings, and in the next issue of the REVIEW we hope to present a complete description of the plant. The accident which occurred to the car on Friday was in no-wise connected with the electrical appliances of the car, but was a broken axle caused by a flaw in the iron, and such a one as might occur to any car.

The long-distance telephone is now working admirably between Boston, Philadelphia, Syracuse and Buffalo, and all the larger cities of New England. Four public stations have been established in Boston, at 53 Devonshire street, 50 Pearl street, 42 Summer street, and at the Adams House, where connections are made with any of the above points.

Mr. James B. Cahoon, of the United States Navy, has about decided to devote his energies to electricity and will probably be located in Boston. Mr. Cahoon is a graduate of the Annapolis Naval Academy, in the class with Mr. Sprague, and later has taken the regular course in electricity at the Newport Torpedo Station, continuing his studies in the advanced special course, and will be welcome in a line in which many gentlemen from the the United States Navy have made, and are making, enviable reputations.

Mr. Leonidas Le Cenci Hamilton, M. A., author of the "Origin of Energy," will deliver a lecture at Horticultural Hall, on next Friday evening, on the subject "Electricity and Magnetism—What they are—Where they come from." The subject is certainly one of great interest to all, and if Mr. Hamilton answers the questions put in his subject his lecture will prove most instructive. The remarks will be illustrated by experiments, and at all events should attract a good sized audience.

The Bentley Knight conduit for the West End Street Railway is being laid down Boylston street, and the works will be completed in a few days. Of the 20 electric cars being made for this section of the road where the Sprague system will be used, eight have already been delivered and four more are now ready.

On Saturday afternoon the New England Club held its regular dinner, and had present as special guests Mr. George W. Mansfield of the Thomson-Houston Company, and Mr. Edward Blake of the Sprague Electric Company, who addressed the meeting on the now universally interesting topic of electric street railways.

Mr. H. G. Bulkham, superintendent of the Edison Electric Illuminating Company of Brockton Mass., was a visitor at this office last week. The business of the Brockton Company is very satisfactory, and Mr. Balkham has recently become associated with Mr. A. Perkins, of Brockton, in the wiring and supply business.

The Robinson Foster Company, owners and manufacturers of the Robinson-Foster system of electric railways, has removed from Exchange Place to more commodious quarters at 75 State street. A factory has been leased which is well suited to the needs of the company, and it will now enter the field as an active competitor in the constantly increasing electric railway business.

Mr. David Chalmers, of the Empire City Electric Company, paid this office a hasty visit last week.

The American Electric Register Company have taken offices in the Hathaway building, 620 Atlantic avenue. Mr. G. W. Austin is president of the company, and Mr. W. W. Montgomery, general manager. The company owns the invention of Mr. E. A. Scales, of Lowell, and manufactures, as its name indicates, an electric register for use in street cars, or on excursion steamers, exhibition grounds, or in play halls, wherever a convenient record is wished of visitors present or customers entering.

The Gassner dry battery has been in use now nearly a year by the Massachusetts Auxiliary Fire Alarm, whose system requires a specially reliable apparatus, and after this thorough test the company express themselves as very highly pleased with it. A substantial proof of this is in the fact that with the spread of the Massachusetts Company's auxiliary system, the orders for the Gassner increase in like ratio.

In Bronson Howard's new play of "Shenandoah," produced so successfully at the museum last week, several very pretty effects are produced by small electric lamps run by two two-cell "C. & C." batteries.

At the Wednesday evening meeting of the Electric Club, Colonel Hewins, of the N. E. Weston Company, gave an informal address at short notice on "Old Fashioned Electric Light Switchboards," the subject having been suggested by a memorandum on the switchboard exhibited by him at Philadelphia in 1884.

The recent levying of an assessment by the Electric Club has brought out a variety of opinions as to the advisability of such a course, some condemning, and others upholding it. T. W. S.

November 26th, 1888.

Manufacturing Notes.

In addition to the fine showing of large isolated plants, presented by the Mather Electric Company on page 2 of cover, the Tewksbury Almshouse, Tewksbury, Mass., should be mentioned. A plant of 600 lights is in constant use and giving splendid results.

Messrs. Davidson & Driggs, the machinery manufacturers of Newark, have been compelled to move to more extensive quarters at 61 New Jersey R. R. avenue. The increase in their business made this more necessary. Among their recent large orders, this firm has placed the new machinery in the enlarged building of Messrs. Baker & Co., the platinum dealers of Newark.

A representative of the REVIEW was a visitor at the Foundry and Machine department of the Harrisburg (Pa.) Car Works, last week. The demand for the Ide engines manufactured here has constantly increased ever since they were placed on the market, and the company was found to be particularly pleased with the increase in orders from electric light circles. Several completed engines were going out the day our representative called, all to electric light companies. Boilers are also manufactured here, three a day, and nearly always accompany the engine. Mr. Hershey, the manager, states that the demand for the Weitmyer furnace is also very great, and deservedly so.

The Factory of the Ft. Wayne Jenney Electric Light Co. Destroyed by Fire.

The Ft. Wayne Jenney Electric Works, at Ft. Wayne, Ind., were entirely destroyed by fire early on the morning of the 23d. Nearly 300 hundred employés were thrown out of employment. The cause of this fire is unknown. The loss is in the vicinity of $200,000, and the insurance $150,000, divided among 51 companies. Very fortunately all the patterns and drawings of the company were saved.

The factory that the company was building at Plymouth was nearly completed and will be running full blast this week, and this, with additional facilities promised at Ft. Wayne, will help the company out with its large orders so that the delay will not be over two weeks.

A despatch to the Press News Association from Ft. Wayne, Ind., says: "It has not yet been definitely settled whether the Jenney Electric Works will be rebuilt here or not. General Manager McDonald, who has returned from New York, says the company will rebuild here if the city will give some assurance that they will be protected from fire in the future. The recent fire might have been controlled and the valuable property saved had the supply pipes been large enough to furnish water for the engines. The company's agents are making a careful inspection of the water supply and may sue the city. The works will be removed to Plymouth, Indiana, temporarily."

OUR WASHINGTON LETTER.

(Special Correspondence.)

The high *potentiality of republicanism* has had a very decided effect on things electric hereabout. Whether the democratic party had become so unaccustomed to office-holding, or whatever may have been the reason, certain it is that the administration has made Washington commercially dull, and electrical departments of business have seriously felt the dullness. Now prospects are brighter.

Electric illuminators foresee rapid increase of business and are calculating how to get more candle-power out of smaller steam engines; street railroads are more than ever anxious to turn out their horses and find some practical accumulator-motor; telephone girls are studying ratios between the number of additional subscribers and additional calls to be answered, and the telegraph operators are rolling up their sleeves in preparation for the stream of business that will set in when Congress assembles next week, that will swell into a mighty river as legislation goes on and roar in raging torrents at inauguration time. In this part of the business all operators can have an equal chance without regard to politics or previous condition—until we get a government telegraph—then civil service, no partisanship and daily dread of dismissal. The change in administration will hinder progress in that scheme during this session, and increase the chances of success later on. The Military Telegraph Corps bill will stand in the same category.

At the capitol the Senate lighting plant, 600 lamps, Westinghouse, is being put in order to resume service next week. J. W. Powell, the Treasury Department's superintendent of electric lights, is preparing plans and estimates for the use of the Committee on Public Buildings for lighting the entire House wing of the capitol. This will require over 3,000 lamps and cost anywhere from $100,000 to $200,000. When this work is done it will probably be found advisable to build a station outside of the capitol park and carry the conductors under ground.

Emile Berliner keeps hard at work on his gramophone. Just now the particular point engaging his attention is the perfection of some method of duplicating his record plates besides that of electrotyping, which is expensive. The copper plates are not hard enough to stand long-continued use without injurious wearing of the etched grooves. Berliner is trying to produce a durable record by stamping the impression on softened glass or porcelain, and has strong hopes of success. When I first saw him he had turned his bed-room into a laboratory, and was spending his nights in experimenting with a second-hand induction coil, a few yards of wire and a battery made out of a fruit jar, a piece of stove zinc and a scrap of copper. It was in that shop that he forged that steadfast little anchor of the telephone craft, the transmitter inductorium, and, at the same time, got just a little ahead of Edison, an eccentricity that he has occasionally indulged in ever since.

The REVIEW's French inventor of an electric target has met Lockwood's "inevitable anticipation" in a patent granted several years ago to Wm. Fischer, a skillful German instrument maker of this city, who spent much time in perfecting the apparatus. The W. U. manager, Morell Marean, is one of a company organized to introduce it.

Pneumatic street car exploiters are talking a good deal, and preparing arguments against electric systems. They see great danger of everything becoming magnetic by the latter. Horses will be paralyzed on the tracks; watches will all go wrong; coins will be attracted out of people's pockets; passengers will be stuck fast to the seats (or to each other), and nothing but pneumatic pressure will set things free.

Professor Bell is home from his Cape Breton summer residence, and Gardiner G. Hubbard has returned from Europe. The latter is next door neighbor to President Cleveland, at Oak View, and to Minister Sackville-West in the city.

James M. Ormes, Elisha Gray's telautograph organizer, has also just arrived from Europe. G. C. M.

Washington, D. C., Nov. 23, 1888.

Telephonic News

*** The Duluth Telephone Company is contemplating putting in an exchange in West Superior if satisfactory arrangements can be made with the Superior Company.

*** The telephone system in Racine, Wis., was burned out last week by a wire breaking and falling upon an electric light wire, which sent a current into the central station.

*** The Missouri & Kansas Telephone Company sent out its quarterly dividend of 1½ per cent. last week, which will reach the pleased stockholder in good time for Thanksgiving. Under the strong financial management of president John R. Mulvane and his very capable co-worker, secretary and treasurer Crandall, this company has become one of the solid institutions of the west, and its stock has deservedly won the confidence of the public to a degree not surpassed by any other telephone company.

*** In Philadelphia the Bell Telephone Company is building a conduit three feet wide through the main streets and avenues of the city, which will contain 50 three-inch iron pipes and 50 wooden tubes laid in cement, with a capacity of 100 wires each, a total of 10,000 wires. Connection will be made with each block by a branch running from a main conduit to the middle of the block, and in nearly all the blocks there are small streets and alleys in which the distributing poles can be conveniently erected, leaving the main streets entirely free from wires.

*** Mr. Alden M. Young will retire from the superintendency of the Waterbury division of the Southern New England Telephone Company, this month. The information will be received with universal regret by the community in whose interest Mr. Young has so long and faithfully labored. It is pleasant to know, however, that in the change Mr. Young will not only better himself, but that his resignation of the superintendency will not necessitate the entire severing of his connection with the company. In 1883 Mr. Young became interested in electric lighting, and the result was the formation of the Connecticut District Telegraph and Electric Company, with D. S. Plume, president, E. T. Turner, treasurer, and A. M. Young, secretary. The company erected an electric light plant in Waterbury, and has for several years been satisfactorily lighting the city by means of electricity. The manager is Arthur O. Shepardson. In addition to this company, there have been organized through Mr. Young's efforts electric light companies at Norwich, Bristol, Putnam, Naugatuck and Thomaston, in this State, Poughkeepsie and Hudson, in New York State, and Paterson, in New Jersey. Mr. Young has also been interested in a number of other electric light companies.

Telephone Bonfire.

THE OLD SOUTHERN TELEPHONE COMPANY'S INSTRUMENTS DESTROYED BY THE BELL COMPANY.

Tuesday November 13th at Little Rock Ark., all the old telephone instruments which were formerly the property of the Southern Telephone Company of that city, 1,229 in all, were destroyed. They had been gathered up several days before and stored in the old telephone exchange in the Vaughan building, from which place they were transferred in wagons yesterday to a vacant lot in the rear of the arsenal, and there burned under the direction of Mr. F. B Knight, special agent of the Bell Telephone Company, and Manager Adams of the Little Rock Exchange. They made a huge bonfire, but it took only about 30 minutes to reduce to ashes instruments which are estimated to have represented a cash value of $15,000. Everything was burned except the batteries, which go to the Erie Company. The metal parts which did not burn in the flames, will be thrown in the river. The Bell Company explain that while the instruments are valuable, they are infringements, and they destroy them in every case like this in order to protect their manufacturer, who pays them a royalty on every instrument manufactured under the Bell patents.

The agent of the Bell Company stated to a *Gazette* representative that there are yet a few of the instruments in the city, which they have not been able to locate, and desires to warn the people that they are liable to be prosecuted for using them or having them in their possession.

Mr. Frank B. Knight is becoming well known as the great torch-bearer of the Bell Company, and has probably set fire to more stacks of infringing instruments than all other telephone men in the country combined.

SOUTHERN ELECTRICAL NOTES.

(Special Correspondence.)

At Durham, North Carolina, the negotiations which have been pending between the electric light company and the gas company, looking to consolidation, have been satisfactorily closed. Work on the gas plant will begin at once, and Durham will be lighted by both gas and electricity about the 1st of January, 1889.

The Thomson-Houston electric light plant at Meridian, Miss., has been completed, and presents an attractive appearance.

The long-pending negotiations between a local company and the Edison Electric Light Company for electric lights for the town of Albany, Ga., have just been closed, and the lights promise to shine before Christmas.

Mr. John Norwood Webb, of Birmingham, Ala., president of the Electro-Libration Company, was married to Miss Kate Studwick Pratt, of Staunton, Va., on October 2d.

Mr. Ed. Burkenhimer, of Wilmington, North Carolina, has accepted a position in the telegraph office at Charleston, S. C. He is a fine operator, and his friends wish him success.

The barkentine E. S. Powell, Captain McCormack, arrived at Charleston, S. C., a few days ago in a dismantled condition. He came up to the city to telegraph his owners for orders. His experience is full of peculiar and interesting incidents. He had loaded a cargo of cedar at Jucaro, and had left for Cienfuegos as a port of clearance; while there, his vessel was struck by lightning. When the vessel was struck, he and his first officer were standing aft, when they saw a brilliant shower of sparks, which fell aft of the foremast. The second officer was also aft, and at the time of the stroke he saw a red-hot bolt several inches long, and of circular shape, fall from aloft. While the second officer was hunting for the bolt, a piece of block fell.

Nothing serious was thought of the matter until the vessel was on her voyage, and was off Alligator Reef, where trade winds and squally weather set in.

Soon the foremast went by the deck, and afterwards followed the maintop masthead, maintop mast, mizzentop mast, jibboom and all attached. As no heavy wind was blowing at the time, only a gentle breeze, the captain is of the opinion that the whole disaster was caused by the stroke of lightning, and he had to make to Charleston as a port of distress.

The Western Union Telegraph Company at Charleston, S. C., are now putting up two copper wires, which will greatly aid the needed force in that city. One of these wires will run from New York to Atlanta, and the other to Augusta. This will enable the company to devote one wire exclusively to the commercial news department. The increase in the company's business at Charleston, in the past two years has been very great, and altogether out of proportion to the enlargement of the facilities for handling it. In the month of September alone, 12,000 more messages were handled at the Charleston office this year, than for the same month last year.

The Georgia Electric Light Company, at Atlanta, Ga., will put in a 100 horse power boiler and engine and two 50 arc light dynamos.

The Paducah Electric Light Company, of Paducah, Ky., have ordered machinery for their electric light plant, and part of some has been received.

The Richard Sauer Manufacturing Company, of Baltimore, Md., who have lately completed a new showcase factory at Locust Point, will put in electric light machinery and have let contract for same. The capacity will be 100 incandescent lights.

The Fort Worth Electric Light Company, of Fort Worth, Texas, will greatly increase their capital stock and form a new company.

The Richmond & Seven Pines Railroad Company will build a dummy railroad to be operated by electricity.

D. F. Torbett will erect an electric light plant for both arc and incandescent lighting at Tuskaloosa, Alabama.

An electric light plant will be erected for the Marine Hospital service at New Orleans.

The Congaree Gas and Electric Light Company, of Columbia, S. C., will add some machinery to their new plant to increase capacity.

It is reported that an electric light plant will soon be erected at Laurens, S. C.

EDWARD A. OLDHAM.

Riverside and Suburban Railway, Wichita, Kansas.

The Wichita and Kansas Electric Railway, which was mentioned last week under the Thomson-Houston Railway notes, has since that time been put into practical and successful operation. On Nov. 13th, at the invitation of the officers of the road, an inspection was made by the Mayor, council and private citizens. The trial was set down for 10 o'clock; but long before that time an immense crowd gathered on Market street and Douglas avenue, where the road starts. Shortly after 10 o'clock two cars were started, the guests having been increased by a delegation from the Board of Trade. The trip was made to the terminus of the Riverside and Suburban Railway line and return, in about one hour and a half, including a long stop for the investigation of the power station at the end of the line. About two miles and a half of railway has been equipped, and work will at once be pushed to complete the line six miles. The president, Mr. J. O. Davidson, and superintendent, Mr. F. G. Fitch, and Mr. F. W. Sweet, manager, all speak in the highest terms of the successful beginning of their electric railway, and are strong in their praise of the action of the Thomson-Houston motors and the excellence of their system in every detail.

*** There are exactly 997 telephone subscribers in Toledo, Ohio, and Manager J. W. Cherry won't tell a lie for three subscribers, or the list would foot up a thousand in short order. The exchange has increased 115 during the past year.

*** Some important developments in telephone work, particularly in switchboards, may be looked for soon. A REVIEWITE recently happened on a party of distinguished experts, composed of E. J. Hall, Jr., W. D. Sargent, A. S. Hibbard, W. H. Eckert, J. P. Davis and John A. Seeley, and learned that switchboards were being discussed. Such a combination of talent is sure to result in remarkable and decided progress.

*** "Did you ever stop to think how much walking is saved by the telephone in a day?" inquires Manager Cherry, of the Toledo Exchange. "Well, we kept an accurate account of all calls made in the office for three days, and they averaged about 9,000 a day. This, mind you, is not counting the number of times in a day that people called when the lines were busy, but the actual number of connections made, aside from outside business. Now, from the length of the wires, we estimate that each call saves a walk of two miles. So you see that 18,000 miles of walking was saved in Toledo in a day by the use of the telephone.'

Early Overland Telegraphy.

The telegraph operator of to-day can lean back in his chair and indulge in a mocking laugh over the trouble which interrupted business between important centers in the early days of the telegraph. About 1865, the best talent of the Pacific Coast, says the San Francisco *Examiner*, was nonplussed over a break in the line between Virginia City and San Francisco. The wire carried the stock quotations, and the market was prostrated by the failure to hear from the mines. Stations were a long way apart, 70 miles frequently intervening between operators. Frank Bell was superintendent of the mountain division, where grades were so heavy that linemen had to clamber up the hills by a hand-over-hand process. An inspection did not disclose the break. Another lineman was sent, and he returned with the news that the wire was all right. Three days had elapsed without a message between the two feverish markets of Nevada and California, and speculators surmised that some one was playing crooked. Then Frank Bell got mad. He swore that he would go over the line himself and examine every inch of wire. Then he sailed forth with blood in his eye and a couple of six-shooters in his belt. He fared no better than his predecessors, although he stuck to his resolution to inspect every inch of that wire. Once only did he falter. The wire was stretched across the top of a high hill where it passed behind a tree. He could see both ends held taut, but not satisfied, he scaled the cliff, climbed in behind the tree, and found the break. The wire, which had parted, had been joined by some one who used a piece of hay rope, thus effectually breaking the circuit. The air was sulphurous about this time, and the superintendent wore himself out apostrophizing the man who had done the job.

Nothing was heard of the break until one day during the following summer, when Frank Bell was out making certain repairs. A teamster pulled up his mules on the road below, and shouted to Bell:

"Say, you telegraph feller," he yelled, "I guess you owe me a drink."

"Not by a —— sight," was the positive rejoinder.

"Yes, you do," came back from the mule-whacker. "I found your —— old line down here last winter and I tied it up for you."

"Then you are the blasted fool I've been looking for," replied Bell, who began to get hot over the recollection as he started down the bluff.

The teamster saw there was something he could not understand, and lit out without delay.

The Los Angeles circuit of the Southern Overland became interrupted in '65. Linemen who were sent out returned, stating that they could not repair the break without a lot of supplies. About a mile of wire and poles had as completely disappeared as though they had been swallowed up by the earth. No trace could be found of the missing material, and the line was reconstructed. Afterward a detective was engaged to solve the mystery. He worked for three weeks on the case, exploring a country that was a mere desert. He was despondent and about to abandon all further search, when he ran across the material in question. He was stopping over night at a small ranch which was surrounded by a neat wire fence. Barbed wire was unknown and the ranchman was taxed with stealing the Overland line. The old settler, who had built a first-class corral at little cost, admitted the impeachment.

"Yes," he said, "I've been living here nigh onto three years, and have watched that durned old line. I never saw anything go over, and thought no one was using it."

The settler was honest, and after reading him a lecture on the invisible nature of electricity, the detective reported. No prosecution followed.

On the San Joaquin trail, the daring engineers who had climbed crag and precipice to stretch their wires, were outwitted by the long-horned Spanish cattle that grazed in the

valley. No timber graced the country, and flies were troublesome. The cattle were tormented by these winged pests, and to get rid of them, crowded to the telegraph line. They would rub against the poles and paw the earth away from the base. Heavy poles would be worn out in a few months, causing frequent interruptions. The line could not be fenced in, and it would not pay to hire vaqueros to drive away the stock. One of those brilliant ideas that change the fate of nations suggested a cure for the evil. Spikes were driven in the poles and the ends sharpened so as to tickle the thick hide of the steers and keep them away from their daily pleasure. The theory was good but it failed in practice. The cattle actually appreciated the change, and brought all their horned companions from 20 miles to enjoy the prickly sensation produced by the invention. After this twice as many poles were needed and the spike feature was abandoned.

Dave Williams was the smartest telegrapher of the day. Quick-witted and fertile in expedients, he ran up to Virginia City in 1865, when the mining world was lying awake nights expecting to hear the decision in the famous Chollar and Wide West claims. Whichever way the judgment went meant a fortune for the first man who got the news. Williams boldly entered the office at Virginia City and openly engaged the three wires running to San Francisco by filing a copy of a newspaper for transmission. The court was tardy, and the newspaper was exhausted before the decision was announced. Williams then passed a Bible over the counter, telling the office staff to grind out on that on their three wires. Agents of brokers, who had been sent to Virginia City on the same mission, tumbled to the deal to shut them out, and induced the manager to wire to headquarters for special instructions. The question of priority on three wires was raised, and the president wired back that priority could only be claimed on a single wire, and not over the whole system. Williams was knocked out, but fortune favored him by delaying the decision for several days. Hastily collecting a camping outfit and hiring a wagon, the plucky operator started for the brush, where he concealed himself at a spot convenient to the telegraph line.

The wire was tapped and a receiver and transmitter cut into the circuit. In this way Williams learned everything that passed over the wires. Nothing interested him until one day the electric spark flashed the news of the decision. A week's vigil had almost exhausted the patience of the desperate schemer. His acute ear detected the first announcement, and instantly grounding the wire he broke the circuit, and then, cutting in, he took up the story and sent an opposite decision through. A cipher was to apprise his confederates in San Francisco what way to buy. The ingenious swindle, fortunately, was frustrated by Mr. Yountz, who was chief operator in this city. He detected Williams' characteristic style in the sending, and knowing that Williams was not supposed to be handling a key in Virginia City, he ordered the bogus and cipher dispatches to be detained. His suspicions were further confirmed by Virginia City messages beginning to arrive from the regular operator. The facts, embracing the language of both dispatches, were compared over the wire and the fraud exposed. This ended Williams' connection with the telegraph system of the Pacific slope. His talents were diverted to stock-jobbing, in which he realized and dissipated several fortunes.

The National Electric Manufacturing Co., of Eau Claire, Wis., has recently sprung into existence. The officers are H. H. Hayden, president, Fitch Gilbert, vice-president, R. E. Rust, secretary, and E. B. Putnam, treasurer. Two other gentlemen, formerly of the Fort Wayne Jenney Company, have allied themselves with this enterprise, Mr. Walter K. Freeman, electrician of the company, and Mr. Chas. Kammeyer, assistant electrician.

The company was not still-born by any manner of means. It has already closed contracts with the Pioneer Furniture Co. for a 250 glow lamp plant, and with the Phœnix Iron Works for a 200 light plant, both in Eau Claire, as well as with the Badgerstale Linen Mills for a 150 light plant. Grace Hotel, Chicago, is to have a 400 light plant, and Lodge, Davis & Company, Cincinnati, 15 arc and 200 glow lamps.

The Synchronous Multiplex Telegraph System.

BY P. LA COUR.

It will be remembered that in 1882 Mr. Paul La Cour, the inventor of the phonic wheel, sold his patent, for the United States of America, to Mr. Jones, with the agreement of mutual communication of any possible improvements. In the same year Mr. La Cour communicated to Mr. Jones an *improved* method of synchronising the phonic wheel at two telegraph stations, and Mr. La Cour at the same time patented it in Europe. Mr. Jones formed a company, the Standard Electric Manufacturing Company, and their engineer, Mr. Patrick B. Delany, took out a number of patents, not only in America, but also in Europe, which treated of the same invention with such modifications as are easily effected with every invention. A committee of the Franklin Institute of Philadelphia rewarded Mr. Delany highly for "his" invention, and when Mr. La Cour protested that the invention was not Delany's, the same committee issued a report, the partiality of which was fully shown in the ELECTRICAL REVIEW of August the 26th, 1887.

Mr. Delany asserted in the *Electrician* of April the 27th, 1888, in reply to the different articles on this subject, that La Cour's original synchronism was an impossibility, and he adds (the *Electrician*, page 715): "If Mr. La Cour will pardon the suggestion, I would advise him to repeat his Fredericia and Nyborg demonstration, unless synchronism in that way has become a lost art. Its reproduction would throw much light on this question. If he succeed without the turn-table, then I will publicly recant all my doubtings."

In the *Electrician* of May the 25th, Mr. La Cour took him at his word, and offered again to work his (La Cour's) *original* synchronism without the turn-table, and as the dispute is really about the *improved* synchronism (which is so similar to that Mr. Delany patented afterwards, that he, Delany, has confounded the two in the synchronism given by La Cour to M. Cassagnes), La Cour offered also to work the improved synchronism entirely in accordance with his patent, in order to give Delany the opportunity of satisfying himself that both the original synchronism without the turn-table, and the improved synchronism, could be maintained perfectly from morning until night. In that case, Delany's right to the invention would be refuted, and La Cour therefore stipulated the condition that "Mr. Delany will pay me for the encroachment which he has made upon my rights the sum of £10,000 sterling, without it being necessary for me to go to law with him about his European patents."

As far as I can learn no reply has been given by Mr. Delany, and the natural conclusion to be drawn is, that he does not believe in his own assertion, that Mr. La Cour's synchronism is useless. The only thing that justified Mr. Delany in taking out so many patents similar to Mr. La Cour's, was the fact that he considered La Cour's synchronism unworkable; therefore it seems proved that Mr. La Cour has been deprived of his rights, and that a compensation of £10,000 sterling would be moderate damages in a matter of so great importance. Mr. Delany's and the Standard Electric Manufacturing Company's silence can, therefore, hereafter only be interpreted in one way.—*London Electrical Review.*

Lighting the City of Chicago.

Commissioner Swift and City Electrician Barrett have been for some time preparing a Christmas gift for the citizens of Chicago, says the *Inter-Ocean*. As much secrecy as possible was used in the work, but it became too extensive to be longer concealed, and yesterday it leaked out.

All of the south side to Van Buren street, West Madison street to Ashland avenue, and all the territory between Canal and Halstead and Madison and Van Buren will be brilliantly illuminated on Christmas night by the city's system of electric lights. The extension of the system to cover this territory will be completed by December 15th, but will not be put into full operation until Christmas.

"I am sorry the plan was sprung so soon," said Commissioner Swift. "I meant it to be not only a surprise, but a very welcome Christmas gift for Chicago. It will not be a surprise now, but it will certainly be welcomed as warmly as any improvement has ever been in Chicago. The beauty of it is, it is no longer an experiment. It is a gigantic success, and before even any of us now believe the whole city will be lighted by the city itself, and far more satisfactorily than at present. In fact, there is no comparison at all. It is the difference between gaslight and electric light.

"The present power house for the whole system is on Jefferson street, between Jackson and Van Buren. It is all completed, and can furnish power enough to run a system twice as extensive as the one we will have in operation Christmas. In the system as it now is, Madison street and the river will form our trunk lines. The working of the electric lights on the river has been seen and appreciated by everyone. The extension of the system will give equal satisfaction.

"When we give our grand opening, 171 electric lights will take the place of 855 gas lamps. Each gaslight is of 16 candle-power, or a total of 13,630 candle-power. Each of the 171 electric lights equals 2,000 candle-power, making a total of 342,000 candle-power instead of 13,680. Each gas lamp costs the city $26 a year, or a total for the 855 to be displaced of $22,230. Each electric light, including interest on investment, will cost not to exceed $55 a year, or a total of $9,405. There it is in a nutshell. We get over 25 times as much light at less than one half the cost. Isn't that a good Christmas gift for Chicago?

"The system will be an ornamental one, too," continued the Commissioner. "The posts are 16 feet high, while the lamp posts are but 11 feet high. We have now 16 miles of conduit laid, and 35 miles of cable. The system, as it will be on Christmas day, will have cost about $50,000. The whole work has been under the personal supervision of City Electrician Barrett, and that is enough to say as to the excellence."

The Commissioner then touched on an electric annunciator, and Professor Barrett was soon on hand, and explained the north side waterworks plant. The Professor said: "From the waterworks we have run a 2,000-foot cable to the new inlet crib house. In the house is a system of reflectors, and 24 thirty-two candle-power lamps. Then we rigged up a quarter horse-power motor on the same cable, and geared it so that it strikes a large fog bell eight blows a minute. At the waterworks, by a turn of a switch, the bell can be set going, and by another switch, the electric lights can be lit. Sailors tell me that they can see this light long before they can see the one on the government pier. The Professor has rigged up a repair shop in the power house, where in future the city can manufacture all the electrical appliances it needs.

Painting Dynamo Coils.

TO THE EDITOR OF ELECTRICAL REVIEW:

Will you please tell me what is used for painting the outside of the field coils of dynamos? The ones I refer to are of a dark red color. Truly yours,

F. J. F.

Oswego, N. Y., Nov. 15.

Make a moderately thick solution of brown shellac in alcohol (not wood spirit). When well digested color with a little Chinese or French vermilion. The vermilion may be added before the shellac, if desired. Apply with soft brush and let harden thoroughly in a warm room for 24 to 48 hours.

On November 7th, the Cambridge (Mass.) aldermen granted the petition of the West End Company for pole rights in Cambridge, and the Thomson-Houston Electric Company is now actively engaged on the overhead line. It is expected that the cars will be put in operation in the course of a month or six weeks.

TELEGRAPHIC

.... Lincoln, Neb., is pleased over the prospect of increased telegraphic facilities.

.... The newly discovered synchronism system of Prof. J. Harris Rogers, of Washington, is attracting much attention in telegraphic circles.

.... The Western Union Telegraph Company has secured control of the Duluth & Iron Range wires. The local commercial public will rejoice at the change for better service.

.... The California Electrical Works of San Francisco, representing the Gamewell System of Fire Alarm, have just closed a large contract to put in this system at Tacoma, Washington Territory.

.... The Rhode Island Electric Protective Company, which has 14 of the national banks and banking institutions, and 88 of the large safes in the jewelry and other stores of Providence under its protection, will open a branch office in Pawtucket, R. I.

....A smart young man the other day went prowling round the Southern Hotel under pretense of doing some electric bell work, which he said he had been sent to do, by an electrical company. His feigned industry cost the servants, whose trunks he rifled, some $45.

.... Lightning rod sharpers are hovering round near Alton, Ill., victimizing the grangers. The company is the North American Rod Company, of Chicago. It is a four-handed game. The advance agent ropes in the farmer to sign a document which purports to rod the buildings for a certain sum. The paper turns up in the hands of a second party, and the sucker finds he has agreed to pay so much per rod of 16½ feet. The collector is accompanied by a lawyer (!) who convinces the victim if possible.

.... A new invention is said to have been perfected in Australia to insure perfect safety to railway trains at high rates of speed. This is attained by running an electric truck at any desired distance in advance of the engine, with which it is connected by electric wires. Should anything happen to the truck, the breaking of the electric current will at once apply automatic brakes, and the train will be brought to a standstill. The experiments are said to have been wonderfully successful. The invention does not provide against the derailment of the main train from causes that would not affect the pilot; but the new device shows the tendency of invention to secure safety to railway trains running at high rates of speed.

.... The general superintendent of the Rock Island Road has issued an order to take effect on the first of December, that each conductor, engineer, yard master, train despatcher, section or bridge foreman, and officer connected with the operating department, and all employees in responsible positions, to carry a watch of a definite standard of excellence—a grade which shall be equal to the "fifteen-jewelled patent regulator, adjusted to heat and cold."

The boys are doing some considerable kicking. They claim that unfair means have been resorted to, to obtain this action, and say that if the matter is unduly passed a strike may result.

One thing is certain. There is no need of particularly nice time-keepers in the pockets of several of the railroad engineers who struck on the C., B. & Q. Road, and it may be that a very common watch would answer for the daily needs of some of the Rock Island boys after a strike is once inaugurated. Strikers are too apt to forget that capital never goes hungry, even in strikes.

The Daft system is to be put in on the Essex Passenger Railway and also on the Newark and Elizabeth (N.J.) line.

The Lynn Gas and Electric Company are now prepared to furnish from their new station on Pleasant street, the electric current for motors, to be used for supplying power in small or large quantities.

The Thomson-Houston Electric Company has shipped the cars for Seattle, W. T., and the overhead construction will soon be completed, so that the road will be in operation on the first day of January, as per contract.

The Thomson-Houston Company has recently closed a contract with Mr. Tom L. Johnson, for the electrical equipment of the Brooklyn Street Railway Company, and the South Side Street Railway Company, Cleveland, Ohio, for the equipment of 40 cars, 10 of which are to be delivered immediately.

Civil Engineer R. S. Brown, of the Daft Electric Company, has been in South Framingham, and speaks very encouragingly of the outlook for an electric railway there. The Daft Company now has 18 cities and towns using its electric railway system. It expects to shortly put 40 cars and 20 miles of track into Springfield, also 200 motors to run in factories.

The Pittsburgh, Allegheny & Manchester Street Railway Company contemplates making a change in the motive power of its cars, and a committee has been appointed to investigate the different systems. This committee is composed of Major Joseph T. Speer. Mr. A. M. Byers and Prof. R. C. Renshaw. They have not quite completed their report, which will be made and voted on at the January meeting of the stockholders.

The recently elected directors of the West End Street Railway Company, Boston, have organized as follows: President, Henry M. Whitney; vice-president and clerk, Prentiss Cummings; treasurer, James H. Goodspeed; general manager, D. F. Longstreet; auditor, C. S. Sargent; purchasing agent, Henry F. Woods; general counsel, Henry D. Hyde; executive committee, Henry M. Whitney, Asa P. Potter, Dexter N. Richards, Isaac T. Burr, Henry D. Hyde.

It is proposed to have a line of electric railway five miles in length, to extend from Leominster Center through North Leominster to Fitchburg, connecting there with the street railway of that city. It is understood that 16 persons representing Leominster, Boston and Lynn have subscribed for 200 shares in the contemplated railway, with a capital stock of $20,000; par value of shares, $100. Of these 200 shares, 191 are held by members of the Thomson-Houston Electric Company, and those directly or indirectly interested in that company.

A lecture upon the subject of "Long-Distance Transmission of Power by Electricity," was delivered at the Franklin Institute last week, by Frank J. Sprague, of New York. Diagrams and formulæ formed a large part in the demonstration of the lecturer's propositions. Given the motor force for a given distance, he said, and the force required for any other distance could be computed and regulated at the generating station. He referred to the difficulty of securing perfect insulation where high potentials were used, and to the uncertain and unknown element of leakage depending upon the weather and the changing conditions of electro-motive force. The leakage, he said, must be so small as to never interfere with the reliability of the transmission. For the purposes of demonstration, he assumed a line of perfect insulation, and drew upon the blackboard the outline of a table indicating the generating and receiving plants, and showing the relative cost and quality of transmission for given distances. The table showed the general conditions existing in the transmission of power.

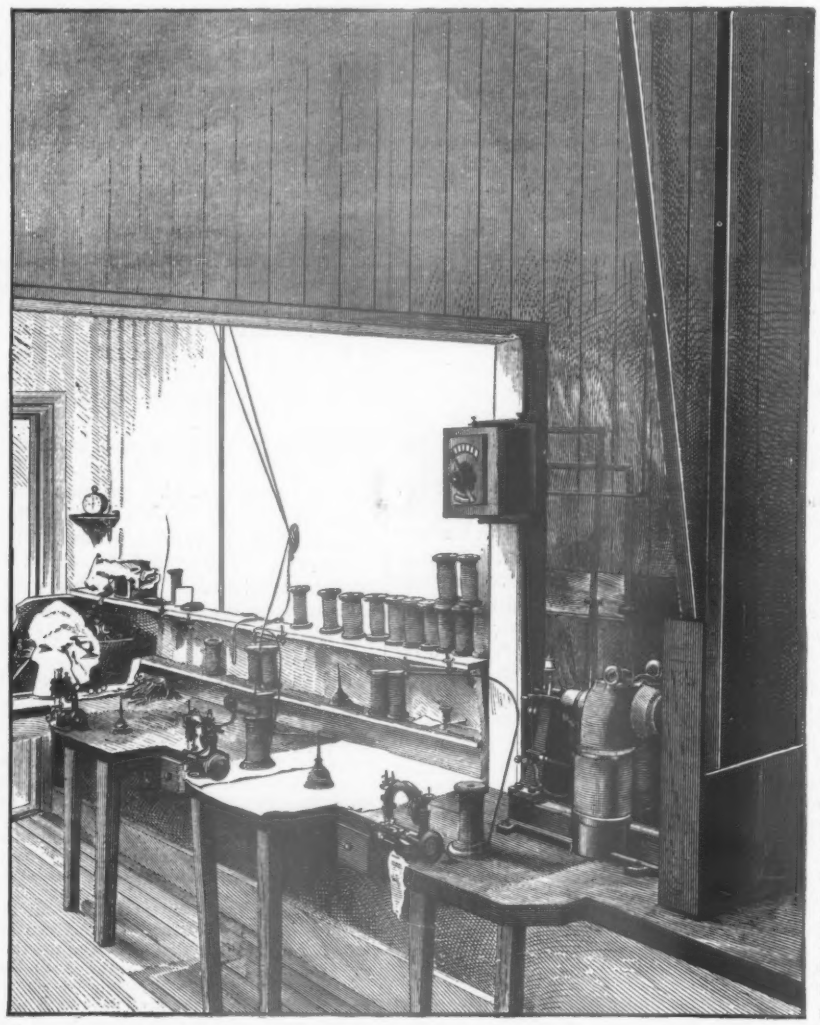
Dole & Osgood, of Peabody, propose to do away with steam-power in their establishment, and will introduce electric motors at once.

The Thomson-Houston Electric Company is laying an electric railway to connect their buildings in Lynn. It will start in the yard, running through the basement of Factory E to Factory A, and thence to Factory B.

Among the incorporators and stockholders of the new Newburyport Electric Street Railway Company, are Mr. W. A. Stiles of the T.-H. Co., Mr. Joseph A. Grant of the Armington and Sims Engine Co., and Mr. John Post, Jr., agent of the Ide and Rollins engines. The capital stock of the company is $100,000.

Electric Power in a Hat Factory.

Another one of the instances in which steam power has been supplanted by the electric motor, is shown in the accompanying engraving. The cut represents a Thomson-Houston motor in the straw hat manufactory of E. Newell, Providence, R. I., where previously a steam engine had been used. The entire factory is operated by this motor, though but three of the machines are shown.



THE ELECTRIC MOTOR IN A STRAW HAT FACTORY, PROVIDENCE, R. I.

Nickel Plating Works.

BIRMINGHAM, ALA., Nov. 12, 1888.

TO THE EDITOR OF ELECTRICAL REVIEW:

We purpose adding a nickel plating department to our business, and wish to place ourselves in correspondence with an experienced practical nickel plater.

SOUTHERN DIST. TEL. & ELEC. CO.

Seattle, W. T.—The Seattle Cable Railway Patent Company. Capital, $60,000. Trustees: H. G. Struve, B. Gatzert, John P. Hoyt, J. C. Haines, J. Furth, Geo. M. Bowman, A. B. Stewart, F. E. Sander, R. H. Denny, Maurice McMicken, of Seattle; J. M. Thompson, of San Francisco, and Samuel Coulter, of Portland, Oregon. Its objects are to construct, repair and equid cable railways, telephone, telegraph and electric light wires, and to build and operate street railroads, telegraph, telephone and electric light wires.

Electrical Notes from Various Points.

Mr. H. W. Burgett will open an office in Dover, N. H., where many modern electrical appliances and inventions will be placed on exhibition.

The Robinson-Foster Company has leased Craig's mills at Newhall's Crossing in South Peabody, and will fit it up for the manufacture of dynamos and electrical supplies.

Springfield, Mass., is becoming aware of the utility of electric door-bells, call-bells and gas lighting apparatus, which are being introduced quite extensively in both new and old residences.

A. T. Gifford, of Hopedale, has recently manufactured for the Collyer Machine Company, of Pawtucket, an incandescence dynamo, 40 sixteen candle-power lights capacity, and weighing but 300 pounds.

At a meeting of the city government of Ellsworth, Me., November 5th, it was voted that the city clerk notify the Ellsworth Electric Light Company that the city must be furnished with a better light to come up to the contract.

The contract made by Mr. W. A. Stiles, on behalf of the Thomson-Houston Company, supplying St. Johnsbury, Vt., with electric lights, was a triumph of no small importance for both Mr. Stiles and the Company he represents.

Alderman Charles E. Billings, of Hartford, has received a patent on his invention of making commutator bars for dynamos by an improved process. The bars have been made in two pieces, and then joined with silver solder. Mr. Billing's invention makes the one bar by a system of drop forging. The Billings and Spencer Company now manufacture these bars for the leading electric companies in the country.

The introduction of electric lighting in Amherst seems near at hand. A large meeting of citizens was held Thursday afternoon to discuss the matter. Two companies petition for the exclusive right to erect the necessary poles; both companies being willing to put in the plant and own it until local parties wish to take it off their hands. Either company is ready to begin operations at once, if the privilege of putting up the poles is granted them. Some resistance will be made by large holders of stock in the gas companies. Men of large observation say that the effect on gas stocks will not be as damaging as might be at first supposed, as, if gas is crowded out of some places, it will be introduced into others where it has never been used, the tendency being that better lighting will be desired. A town meeting will probably be called to consider the matter.

The suit of the Schuyler Electric Company against two electricians who were formerly in its employ, was tried in May before Judge Sandford. The judge reserved his decision at the time, but subsequently decided in favor of the defendants. The plaintiff appealed to the Supreme Court, and the case was argued Tuesday by Hyde & Joslyn for the plaintiff, and ex-Governor Ingersoll and Silas A. Robinson for the defendants. During the trial, it appeared that the defendants were employed by a Hartford company, of which George M. Bartholomew was president, but the concern suspended operations when the defaulter visited the queen's dominions. Subsequently a Middletown company was formed which purchased the assets of the Hartford company. The defendants claimed that their contract with the original Hartford company could not be assigned to the Middletown company without their consent. They consented to come to Middletown, however, and were for a few months in the employ of the Middletown company at salaries of $1,400 each. They withdrew from that service and denied the company's claim concerning the transfer of the original contract. The company asked for an injunction which should prevent the defendants from disposing of certain inventions of theirs to other parties, and also asked for an order compelling the defendants to assign certain other inventions to the Middletown company. The title to 15 patents is involved in the suit. The arguments in this appealed case of Schuyler Electric Company *vs.* Herman Lemp and Merle J. Wightman, were heard before the full bench of the Supreme Court of Errors, at the State Capitol.

The new building of the Lynn Gas and Electric Light Co., on Pleasant street, is nearly completed; some of the inside work only requires putting up. It is a large brick building of one story, with basement, and has a frontage on Pleasant street of 65 feet, and a depth of 127 feet. The greater part of the building is occupied by the boiler and dynamo rooms. The boiler room has an outside dimension of 45 by 65 feet. The total boiler capacity is 650 horse power. A Worthington Duplex pump and a Deane pump will be provided. The dynamo room has a floor resting on three rows of piers, with girders 10 by 12, and floor timbers 8 by 14. It is 81 feet long by 65 feet wide. The floor consists of three inch matched spruce plank, covered with 1⅛ inch birch flooring. It is well lighted by 18 large transom windows. A new Fitchburg engine of 300 horse power, the cylinder of which is 26 inches in diameter, with a 40 inch stroke, has been installed. The fly-wheel is 16 feet in diameter, with a 25 inch face, and the wheel makes 95 revolutions a minute. The main shaft is 58 feet long, the driving pulley 56 inches in diameter, with a 25 inch face. The main belt is 106 feet long and 24 inches wide. The head shaft of the engine is seven inches in diameter and the balance of shaft five inches. The shaft makes 325 revolutions per minute. There are three 35 light dynamos, seven 30 light, and two alternating incandescent dynamos of 500 each, all of the Thomson-Houston system. A 95 horse power generator will run the horse railroad, Highland line. There will also be moved from the old station one engine of 60 and another of 50 horse power. All the engines are connected with the Deane condensers and National feed water heaters. The chimney of the building is 100 feet high; the flue is five feet four inches at base, and five feet eight inches at top. J. F. Perry, of Lynn, set up the electrical apparatus.

The Grosvenor Gallery Central Lighting Station.

The large Ferranti dynamo at the Grosvenor Gallery central station is illustrated in this issue. There are about 35,000 ten candle power incandescent lamps provided for. Two Ferranti machines are used, each designed for about 10,000 ten candle power lamps, although one of them has taken a load of nearly double that number (19,500) without injury. These machines are described in the *Electrician*, and stand nine feet six inches in height, with a floor space nine feet by 11 feet. The armature is not built up in the way usually associated with the name of Ferranti, but is composed of separate bobbins, after the Siemens type. The coils are wound on laminated cores of gun metal and German silver, and are composed of copper tape one-half inch in width by .06 inch in thickness. The tape is slighly corrugated in order to pevent its slipping on the crown of the core, which is also corrugated to receive it. The insulation is wound on with the tape, and consists of hard vulcanized fibre of one-half mm. thickness. One end of the bobbin is soldered to the core, which is insulated from the frame by blocks of ebonite held in cast-iron clamps. In the Deptford machines we understand than an improved method will be adopted. There are 40 coils, each consisting of 25 turns, connected 20 in series and two in parallel, so as to keep the points of maximum difference of potential at the opposite extremities of a diameter. The diameter of the armature is 8ft. 6in., and its resistance when hot 1.1 ohm, which at 2,400 volts gives a loss of only 7,000 watts, or 1 36 per cent. on the maximum output. The speed is 260 revolutions per minute, which is equal to a peripheral velocity of 6,942 ft. per minute. The field-magnets are 80 in number, and are set very close together, 40 on either side. The coils are connected in eight parallels, and have a resulting resistance of one ohm nearly. The field-magnets weigh 17 tons, the base plates 13 tons, the pulley (diameter 5ft.) weighs two tons, and the armature one and a-half ton.

The exciters are shunt-wound Siemens machines, giving 100 volts and 108 amperes; they are coupled direct to the shafts of the Ferrantis. The latest addition to the plant is a 12-unit Kapp machine, also shunt-wound, which is at present used chiefly for lighting the engine room, but is also intended as a standby for the exciting current in case of need. Switches are arranged for this purpose. There is a constant oil service for each of these machines; the tank holds 300 gallons, and the circulation is effected by two Worthington pumps. Castor oil is used, and the used oil is returned through two strainers. Two Babcock & Wilcox boilers are used, each of 150 horse power.

—— Ald. Campbell's scheme for Chicago city gas works is generally ridiculed. It is not feasible, because under the constitutional limitations, enough money cannot be obtained by taxation or the issue of bonds for the purpose. Moreover, electric lighting will soon supplant gas for public illumination, and the city has now the nucleus of a splendid electric light plant.

—— Brockton has the distinction of being the first city in New England, and probably the first in the country, to have a shoe factory run entirely by electricity. The Packard and Grover shops will be run by a 20 horse-power Sprague motor, all the machinery to be run by this means, the electricity to be supplied from outside. The cost is estimated at much less than the expense of running an engine and boiler, without counting the cost of them.

—— The trustees of the village of Green Island, near Troy, N. Y., has granted to the Thomson-Houston Company a franchise to erect poles and string wires for furnishing electric light for the village. A. A. Hunting, who was present in the interest of the company, made an offer to light the village streets with 16 arc lights of 200 candle-power each, at $100 per lamp a year. No action can be taken until the annual tax meeting next spring, when the matter will be brought up.

NEW ENGLAND NOTES.

The Malden Electric Light Company is now prepared to light houses with electricity and anticipates a large business in that line. The electricity will be measured on meters which register the number of hours the lights are in use. Many private houses have already been wired and the company expects to do an extensive business in this line

The city of Biddeford, Me., is discussing the advisability of largely increasing its electric street illumination with the chances in favor of such a thing being done.

The Cherryfield Electric Light Company, organized at Cherryfield with a capital stock of $7,000; amount paid in $700; par value of shares $100. The stockholders are W. M. Nash, David W. Campbell, Charles P. Nickels, Charles Campbell, J. S. Nickels, Samuel N. Campbell, J. W. Coffin, Jr., B. M. Gouldrick, G. H. Ward and F. I. Campbell, Cherryfield; C. B. Storey, Brunswick. W. M. Nash is president, J. W. Coffin, Jr., treasurer, and W. M. Nash, D. W. Campbell, G. H. Ward, C. P. Nickels and Samuel N. Campbell are directors. The purposes of the corporation are manufacturing and generating electricity at Cherryfield in the county of Washington and said State of Maine, and also supplying the same to consumers for heat, light and power within the limits of the town aforesaid, and for doing all things deemed necessary or advantageous for carrying out said purposes.

The Danbury, Ct., merchants have carried out their threat and have ceased to use electric lights, the company having refused to reconsider its advance in prices.

The Newburyport, Mass., Electric Light Co. stock is quoted at $110; par value $100. Not bad for a one year old company.

C. L. Abbott, formerly of Watertown, Conn., is superintending the erection of an electric street railway plant in St. Louis.

Mr. George H. Grant, manager of the Ellsworth, Me., Electric Light Company, has ordered 500 new cells which, when added to the present power, will give the works a capacity of 1,500 lights. The company will for the future conduct their works upon the plan of storing electricity by the use of storage batteries or accumulators.

I. F. Baker, assistant superintendent of the Thomson-Houston Company's works, returned Sunday night from New Haven, Conn., where he has been on his wedding trip.

Mr. Frank E. Hatch is engaged in putting in an electric lighting plant of the Mayo system at Dugan's tannery in Lynn. The Mayo headquarters are now at Belmont, N. Y.

It has been thought by some that the matter of rival electric light plants and electric street railway franchises would enter largely in the mayoralty contest in Woonsocket, R. I., but by the city charter such matters are given into the exclusive control of the aldermen, the mayor not even having veto power.

The city council of Lynn has granted a permit to the Thomson-Houston Co. to lay tracks on Berkely street. This enterprising corporation has done and is doing a great deal to build up the western part of the city, and it is entitled to such encouragement as the government can consistently give.

The Trustees of St. Johnsbury, Vt., have closed a contract with the Thomson-Houston Electric Company, to light the village for three years, and the Water Power Company has leased power to the Thomson-Houston Company for ten years.

The "freeze out" electric light competition law, of Connecticut, is of particular interest to Danbury just at present, in the light of the recent action of the Danbury and Bethel Gas and Electric Light Company. It has been maintained by many misinformed people that the permission of the borough authorities is all that is necessary for enterprising men to start an opposition company there. That is just what this law was intended to prevent, and every petition for a charter for an electric light company will run against a big lobby at Hartford next winter. There will be some hot fights in this connection, and Danbury may participate.

A new motor car, ordered by the electric road of Ansonia, Ct., some time ago, arrived recently from the J. G. Brill works, Philadelphia.

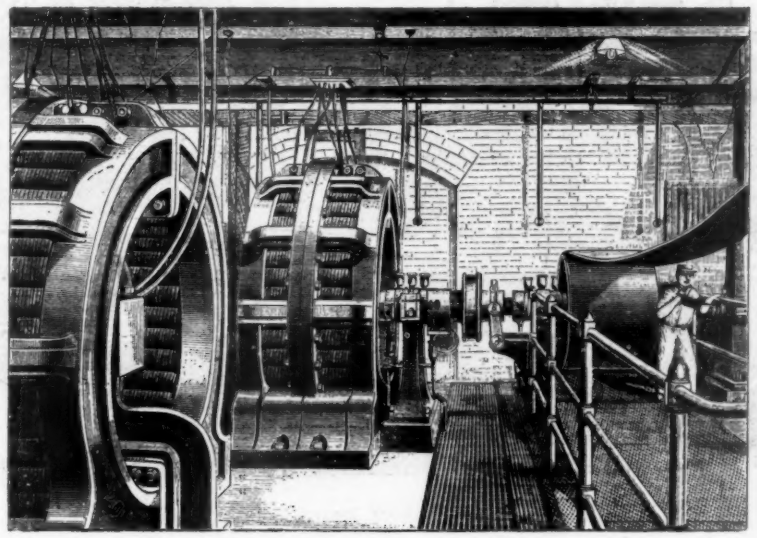
A gentleman in Portland, Me., has been greatly annoyed by the continued failure of the incandescent electric light in front of his house to burn. He has complained to the company several times, but to no purpose. The other evening a party of friends visited him and, as usual, the street was in total darkness. Before the visitors left a friend who lives next door, as a joke, procured a dirty old lantern and, having lighted it, hung it to the top of the lamp post, where it rivalled the electric light in brilliancy. The joke was not appreciated; the next day the gentleman remarked that the electric light people were very obliging, for when they found they could not make the electric light work they had actually hung a lantern in its place.

The First National Bank of Portsmouth, N. H., is hereafter to transact its business with the aid of electric illumination.

Ellsworth, Me., is realizing the advantages of accumulator plants, and Mr. George H. Grant, manager of the local electric light company, has ordered 500 new cells of the Electric Accumulator Company.

Electric lights are being put into T. L. Barber & Co's. straw factory, and will also be put into the Gossamer rubber factory at South Framingham.

Whenever a Hartford policeman discovers an electric light on his beat to be extinguished, he makes a memorandum of the location of the light and the time when it ceased burning. This memorandum he puts upon a postal card which he mails to the street board. Often the time when the lamp is relighted is not given, and the street board cannot tell how much time to charge against the electric light company. The board has, however, adopted a rule that whenever a light is reported out, an hour shall be deducted from the service as charged by the electric light company. When a light is reported two or three consecutive nights as out, the company is required to replace it.



THE FERRANTI DYNAMO AT THE GROSVENOR GALLERY STATION.

ELECTRIC LIGHT NEWS

—— The Hallowell, Me., city government has voted to contract for electric lights.

—— The electric light which the duchess of Marlborough (Mrs. Hamersley) has put in Blenheim palace has been completed.

—— The Nashua, N. H., electric light station is being equipped with the Thomson-Houston incandescent alternating system.

—— The city of DuBois, Iowa, is considering plans for electric lighting. W. Perry, city clerk, having the matter in charge.

—— The Milford Electric Light Company are putting in five 65 candle power incandescent lights in the office of George Draper & Sons, Hopedale, Mass.

—— Speaking of the care now exercised by his electric light men, Mr. Edison is quoted as saying that his foreman has been seen to put on rubber gloves to write a note!

—— The United Light and Fuel Company, of Gardiner, Me., has asked for a franchise to light the streets of Bath, for a period of twenty years. The price is not stated.

—— The Cambridge Board of Aldermen has granted the West End Railway Company locations for 221 poles on Main and Harvard streets on which to run wires in connection with the electric railroad.

—— In addition to the three electric arc lights used in St. Paul's M. E. Church, Lowell, two large incandescent lights will be placed under each gallery. This method of lighting has undoubtedly become a permanent fixture at this church.

—— The addition of new electric light and gas burners, of burnished brass, has been completed throughout the capitol at Albany, N. Y., and the new system is in working order, much to the delight of the clerks, who are obliged to work a portion of the time by the aid of artificial light.

—— The falling of the electric light tower at Grand River and Third avenues, Detroit, a short time ago, results in a damage suit in the Wayne Circuit Court. The Brush Company sue Albert and Frank Goodman, who were moving the building which it is alleged broke the guy cable, for $3,000.

—— The Edison electric light people in Pittsfield have now over 1,600 lights in their system, and more are to be added soon, so that the company expect to have about 1,800 before the first of January. The superintendent is attaching meters as fast as possible to all the places where their lights are being used.

—— A New York, Canadian and English syndicate has purchased the Isle au-Heron in Lachine Rapids, for the purpose of developing water power for furnishing electric power and lighting for Montreal. The building of the necessary dams, bridges, etc., is to be commenced at once. The improvements will cost $500,000.

—— The machinery, poles, etc., of the Beaver Valley Electric Light and Power Company, Beaver Falls, Pa., have been received and are being set up. The dynamo can be made ready for business in six hours, and the arrangement for water power is such now that as soon as the machinery is made ready the belt can be thrown on and the power transmitted.

—— The United States Electric Lighting Company, at Washington, D. C., has elected directors for the coming year as follows: Samuel Norment, Matthew G. Emery, Wm. E. Clark, Seymour W. Tulloch, A. B. Thomas, Clarence F. Norment, James L. Norris, Wm. Dickson, and A. M. Renshaw. The Board organized by electing Samuel Norment, president; Wm. Dickson, secretary; Seymour W. Tulloch, treasurer; A. M. Renshaw, general manager

"Electricity Our Defence."

[From the London *Electrician*.]

Speaking at Islington on the 1st inst., Mr. Stanhope enumerated some of the various ways in which our coast defences should be improved; and he dwelt particularly upon the importance for this purpose of electrical submarine mines. Had the Secretary of War possessed the advantage of reading Captain Zalinski's lecture, delivered a few days before in New York on a similar subject, his recommendations would have been possibly more emphatic, and his confidence in electrical defences still more pronounced. Captain Zalinski, of the United States Army, is best known in England in connection with the famous dynamite gun, of which we shall have more to say presently; but his lecture at the Electric Club was devoted to a general survey of the ways in which electricity has been adapted to the appliances of warfare, or, more exactly, of the improvements effected in those appliances by the application to them of electrical science. The title of his paper was "Electricity as Used in Sea-Coast Defence," but with their usual felicity the American press have re-named it "Electricity, our Defence," a title which is so truly appropriate here that we have not scrupled to place it at the head of this article. [This "felicitous" heading appeared only in the ELECTRICAL REVIEW, where our contemporary saw it, as well as the complete Zalinski lecture—and the name of this journal is not the "American Press." Does our English neighbor see the point?—ED. REVIEW.]

Captain Zalinski classifies his electrical subject roughly as follows: Military telegraphy; range and position finding; lighting; motors; manipulating guns; directing torpedoes; igniting mines and firing torpedoes and guns. In the last-named of these the lecturer probably included the ignition of gun charges, as is done in the case of the pneumatic dynamite gun, the projectile of which carries its own batteries and is exploded electrically, either by contact with water, or by making electrical contact on concussion against a solid substance. The best form of fuse was of such importance in connection with this invention, that some very exhaustive and valuable experiments were carried out in conjunction with General Abbot, U. S. A., and other gentleman, resulting in the adoption of a low-tension fuse of platinum iridium being selected for the bridge, as having a higher resistance and lower specific heat than pure platinum. It is with fuses of this character that the charge of the pneumatic gun is exploded. The problem in this case was to protect the filament from rupture prematurely, but Mr. Smith, Captain Zalinski's assistant, has succeeded in making a bridge solidly embedded in a pellet of compressed powder. Protected in this way, it is possible to use the electrical fuse in an ordinary gunpowder shell. For the pneumatic gun two small batteries are enclosed at the rear of the charge, one dry, the other wet, and are ingeniously arranged so as to prevent accident, but to insure their final action when once projected from the gun. The experiment with the "Silliman," a small vessel, 80 feet long, resulted in its complete destruction at a one mile range, after three or four rounds of dynamite had been discharged. The accuracy of the firing seems to have been remarkable, and in no instance did the shell fail to ignite.

With Captain Zalinski's description of the present condition of military telegraphy we need not trouble our readers here, as most of his example, are taken from English or German sources. A similar remark will apply to his interesting account of subterranean and submarine mines, full reports on the latest improvements of which have recently appeared in these pages. The great value of these appliances, however, for coast defence is insisted upon with much force of argument and illustration in Captain Zalinski's lecture, and we commend it to the consideration of the naval and political authorities of this country. Naturally, Major Watkin's range and position finder occupies a prominent place in the lecture; and a very good attempt is made to lay bare the secret for which the English Government paid £25,000, and is paying a ten years' annuity of £1,000. So long as the States keep on friendly terms with the mother country we shall always be pleased to hear that "American electricians could do quite as well in this field of ingenuity" as the English Major Watkins. Just at present, however, we are rather glad they have not hurried themselves.

The merits and demerits of the electric light for revealing the position of the enemy are fully gone into by the lecturer, but with no very definite pronouncement. The Mangin projector is the form used in America, and it is urged that hand-regulation is preferable to automatic, in order to obtain any required length of arc, and for other practical considerations, especially on shipboard. With much greater confidence does the author speak of the employment of the electric motor for the working of guns, a method which he rightly argues is far superior to hydraulic or pneumatic machinery in point of safety and efficiency. Captain Zalinski cordially approves of a suggestion to work the dynamo for electric lighting of military trenches by horse-power. The dynamo and horse-power apparatus would be comparatively light, and easily transported. It is interesting to note that Major G. S. Clark, of the Royal Engineers, is credited with this capital idea. Apparently the best American ideas on the subjects here discussed emanate from the corresponding branch of the U. S. Army. On the importance of keeping up the technical and scientific training of the Engineering Corps, Captain Zalinski is very emphatic, and he utters some much needed words of warning on the prevalent misunderstanding as to the simplicity of sub-marine mining, and the ease with which it is supposed to be capable of being improvised. The problem of harbor and coast defences is, to quote his own words, "complex in character, requires the greatest care in the preparation of material and in the training of the *personnel* to manipulate it. Every detail must be carefully prepared; there must not be a single weak link in the chain, or the system is likely to fail." The author gives us credit for being ahead of the States in these respects; but none the less, at a time when we are extending our system of defences, the conditions on which their usefulness depend should be constantly kept in view. The sufficiency of the appliances themselves, and the part played in them by electricity as shown in Captain Zalinski's paper, would justify us in saying that, properly directed, they can hardly fail to secure for us that immunity from external assault concerning which the recent naval manœuvrs left us with some misgivings.

New Sprague Motor Truck.

We take pleasure in presenting our readers this week with a view of the new electric motor truck, constructed by the Sprague Electric Railway and Motor Company of New York. This truck is complete in every detail, and carries two powerful 15 horse power motors of new design and of the finest workmanship.

Everything is adapted for durability and convenience. The motors have the regular Sprague mounting, being centered on the axles, and flexibly supported to prevent accident from sudden strain. They are very compact and powerful, and combine the requisites of lightest weight possible with high efficiency. The most recent improvement in mechanical and electrical design has been adopted to meet the exigencies of street car service. The armature pinion meshes into an intermediate with vulcanized fibre teeth to insure quiet running, and the pinion of this shaft into the main gear. All bearings are self-oiling and completely dust-proof, and each is independently removable.

In fact everything is designed for ready replacement and with a view to reduce the attendance and care to a minimum.

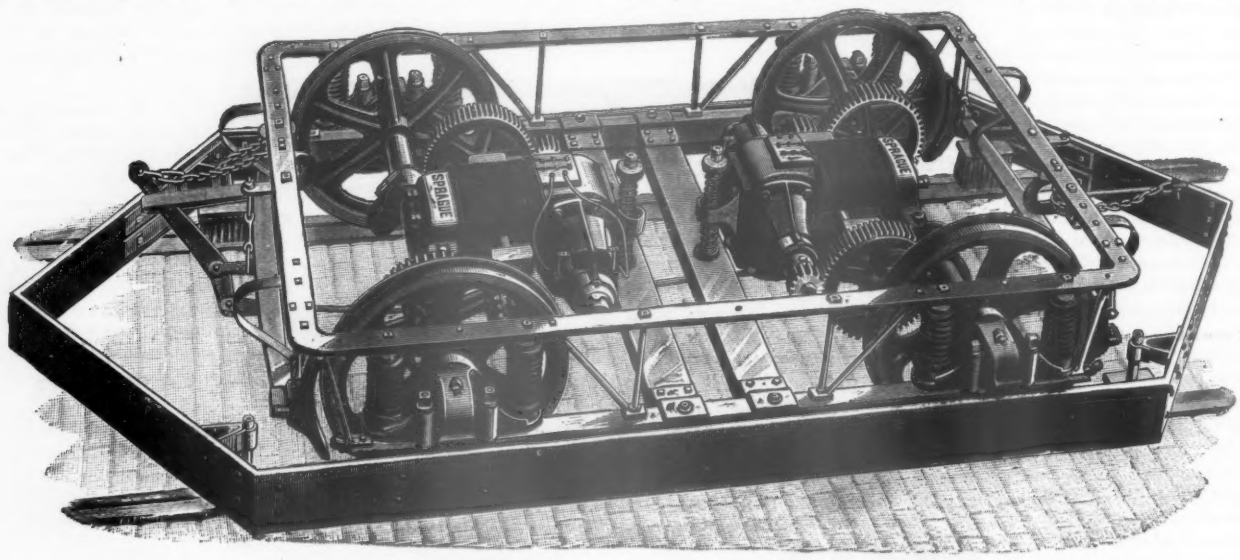
The construction of the brushes is interesting, as they are made on an entirely new principle, and are remarkable for ease of adjustment. Each brush consists of a brass-holder, containing a number of flat square copper stripes or laminae, held loosely in the holder of a pin passing through their centers.

These laminae set themselves in the direction of rotation and the surface of contact conforms the surface of the commutator. By this means the necessary electric contact is obtained without excessive pressure on the commutator, and all wear is reduced to a minimum.

A tight-fitting cover, covering the machine and gears, is attached to protect the machinery from dust and injury. The gears are of small diameter and symmetrically placed.

The design and the construction of every part of this truck is not only to have each detail as strong as possible, but also to make it readily accessible, and to reduce all necessary attendance to a minimum.

We congratulate the Sprague Company upon the completeness of their new apparatus.



NEW SPRAGUE MOTOR TRUCK.

Pulsatory Currents.

A suggestion which has been embodied in a patent by Gustave Pfannkuche, depends for its effect upon a pulsatory continuous current in the place of an alternate current. The inventor contends that it is just the same whether you have a variation of E.M.F. on one side of the zero line, or a variation of E.M.F. which is the sum of the variations on the opposite or negative side of the zero line. Thus by a pulsatory current which has a varying E.M.F. of 50 volts, you would get the same effect from a converter as from an alternating current which had that variation. The advantage claimed for a pulsatory over a continuous current is that arc lamps and motors working at the medium line of the pulsation could be run on the same mains as converters, and that also electro-deposition might be carried on. The available E.M.F. which the pulsatory current develops is the average of the varying potentials, and if the pulsations be sufficiently frequent, the action of an arc lamp, or motor, or depositing vat would be the same as acted by a continuous current having this amount of E.M.F.—*London Electrical Engineer.*

—— The central electric lighting station in Leominster, Mass., is to be a building 30x 50 feet, with a boiler house 25x40 feet, will be erected. The foundation for it is begun, and a 90 horse power boiler already ordered. Leominster is a good field for electric lighting operations, as the village is compact, gas is very high and of a poor quality, and the people are tired of it. Probably the Thomson-Houston system will be introduced.

—— The consolidation of the works of the gas and electric lighting companies at Athol, Mass., is going on rapidly. A new boiler and engine are being put in place, and as soon as they are in running order connections will be made and the apparatus will no longer be run by power from the cotton mill dam. The water power is amply sufficient for the purposes of the electric light company, and is of course much cheaper than steam, but the economy of labor resulting from having the gas works and electric light works all in one place, with the consumption of the coke produced in the manufacture of gas will, it is thought, about even up matters. The gas service is now satisfactory, and the arc lights have always been good except during heavy rains which cause the main belt to slip—the temporary connections with the water wheel being somewhat exposed to the weather.

—— The Thomson-Houston Electric Co. reports the following new business: Chattanooga, Tenn., 200 arcs; Findley, Ohio, 185 arcs; Wood, Brown & Co., Philadelphia, Pa., 80 arcs; Young, Smith & Co., Philadelphia, Pa., 80 arcs; Ensley, Ala., 35 arcs, and the following increases: Johnstown, N. Y., 50 arcs; Salem, Mass., 25 arcs; Columbus, Ohio, 100 arcs; Worcester, Mass., 35 arcs; Portland, Maine, 35 arcs, 300 incandescents; East River Company, New York City, 100 arcs, 1,000 incandescents; Toledo, Ohio, 100 arcs; Mobile, Ala., 35 arcs; Nashua, N. H., 45 arcs; Oneida, N. Y., 35 arcs; Waltham, Mass., 30 arcs; Cambridge, Mass., 45 arcs; Columbia, S. C., 50 arcs; Atlanta, Ga., 50 arcs; Hyde Park, Mass., 50 arcs; Buffalo, N. Y., 300 incandescents; Stamford, Conn., 30 arcs; Rome, N. Y., 50 arcs; Somerville, Mass., 30 arcs; Waterville, Conn., 500 incandescents; Malden, Mass., 300 incandescents.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING NOVEMBER 20, 1888.

393,012 Metallic connector for electric railways.
393,013 Conduit for electric conductors; Joshua Kames, Philadelphia, Pa., assignor, by mesne assignment, to the National Electric Conduit Company, Camden, N. J.
393,029 Insulating composition; Adolph Portevent, Gainesville, Miss.
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393,088 Instrument for measuring electrical currents; Addison G. Waterhouse, Hartford, Ct.
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393,146 Mechanism for changing electric circuits, etc.
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393,165 Electro-magnetic shunt for telephone receivers; Thomas D. Lockwood, Melrose, Mass.
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393,276 Underground conduit for electric conductors.
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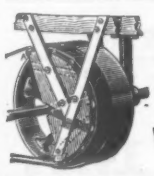

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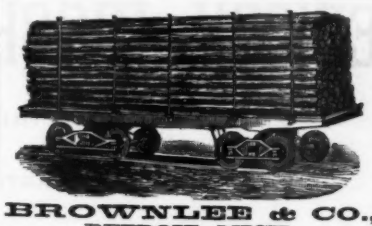

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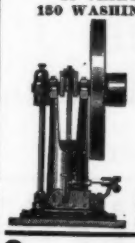

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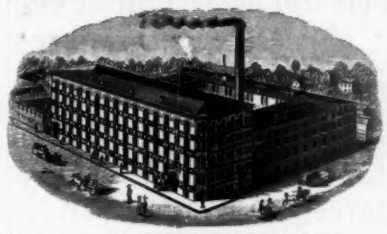

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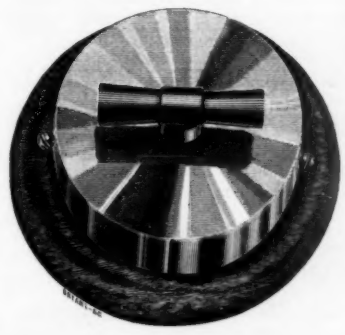

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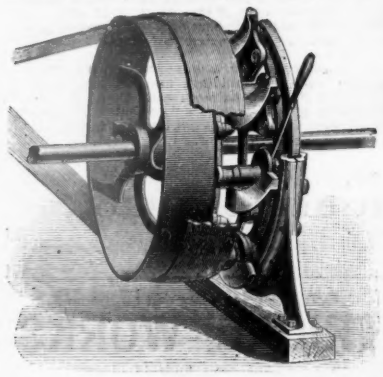

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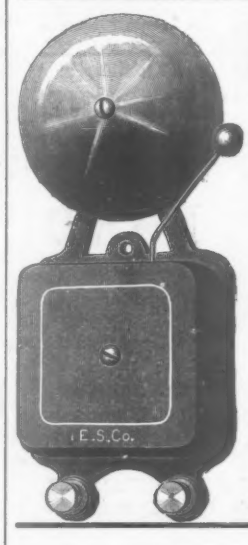

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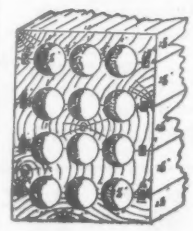

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